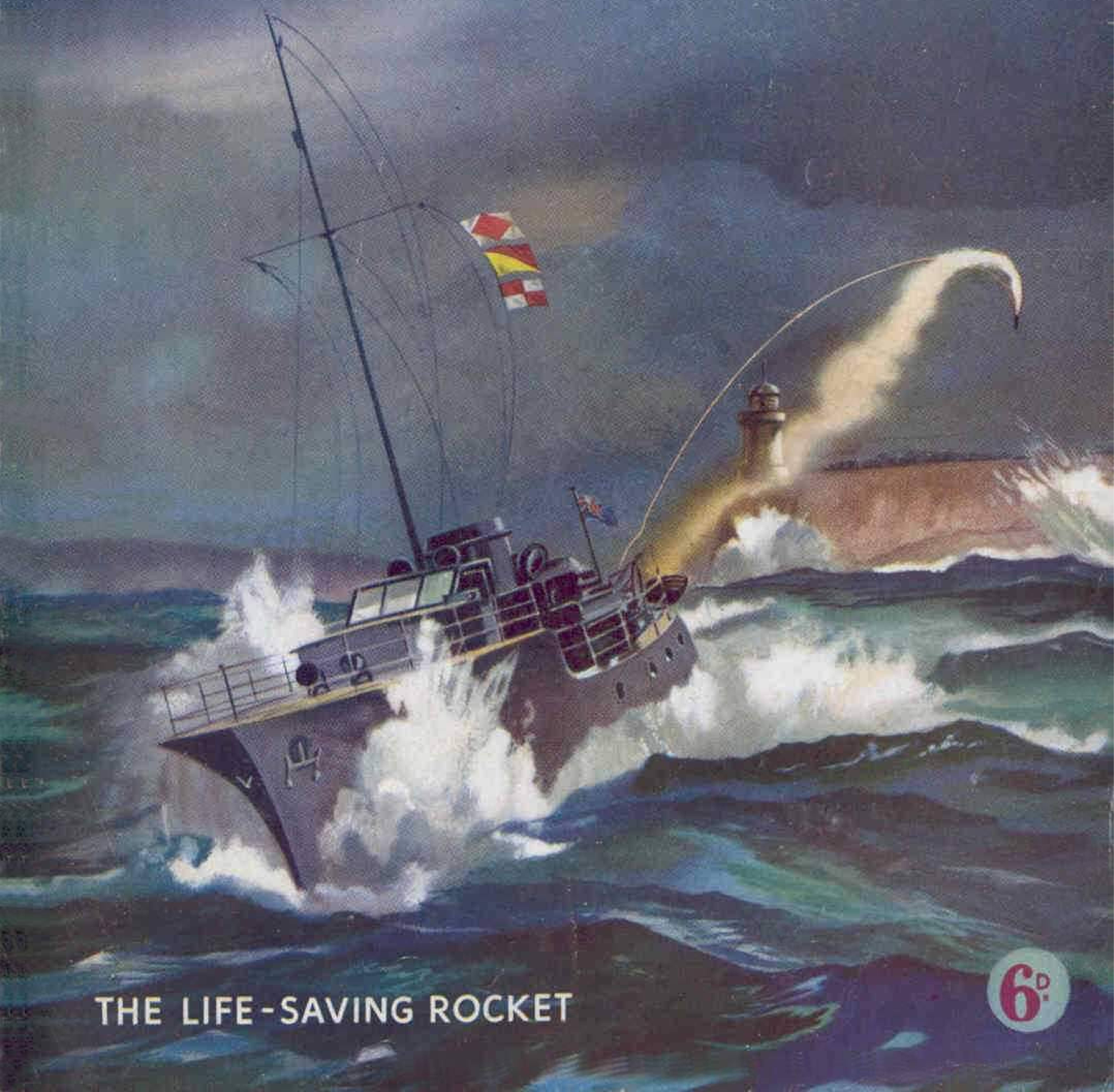


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AUGUST 1943

MECCANO

MAGAZINE



THE LIFE-SAVING ROCKET

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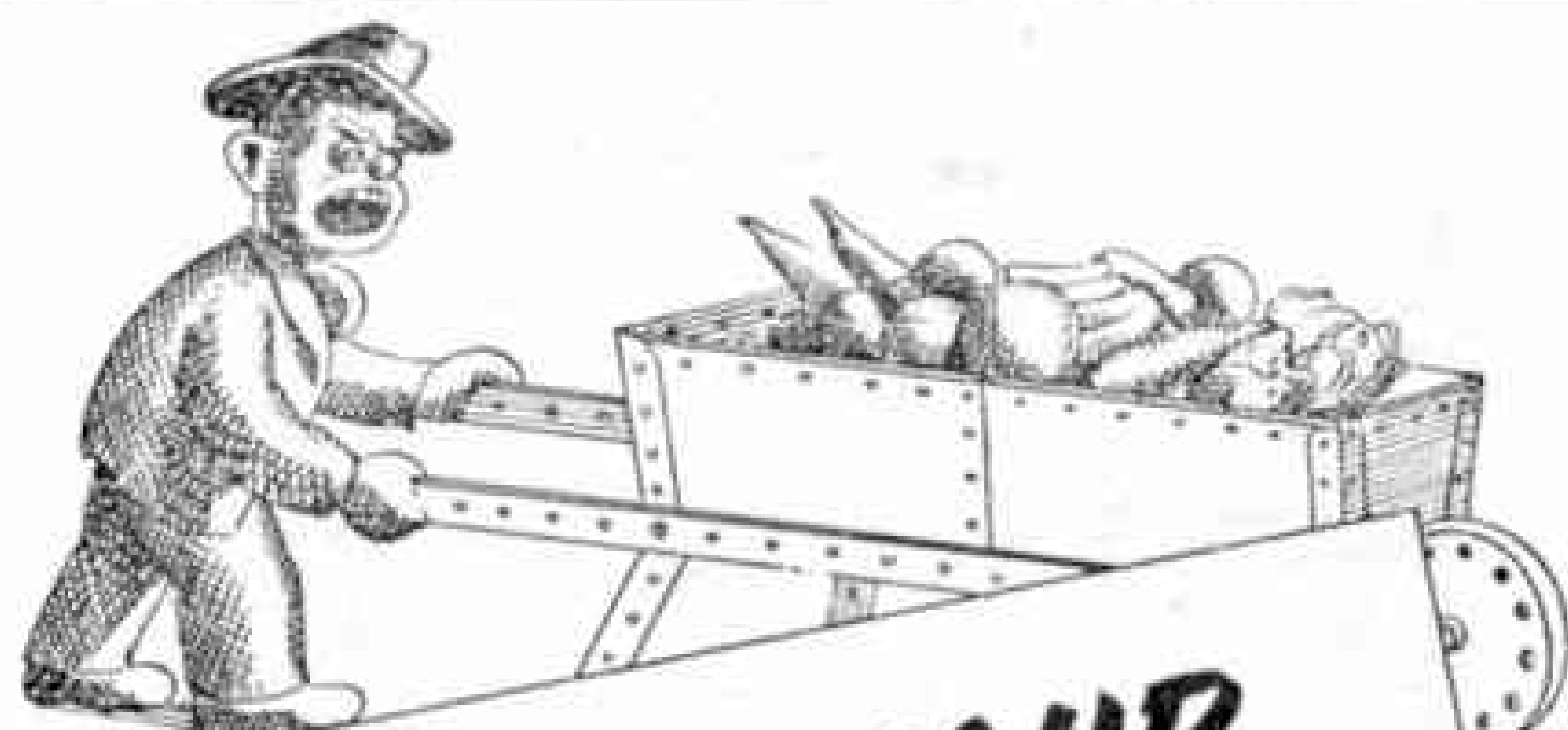
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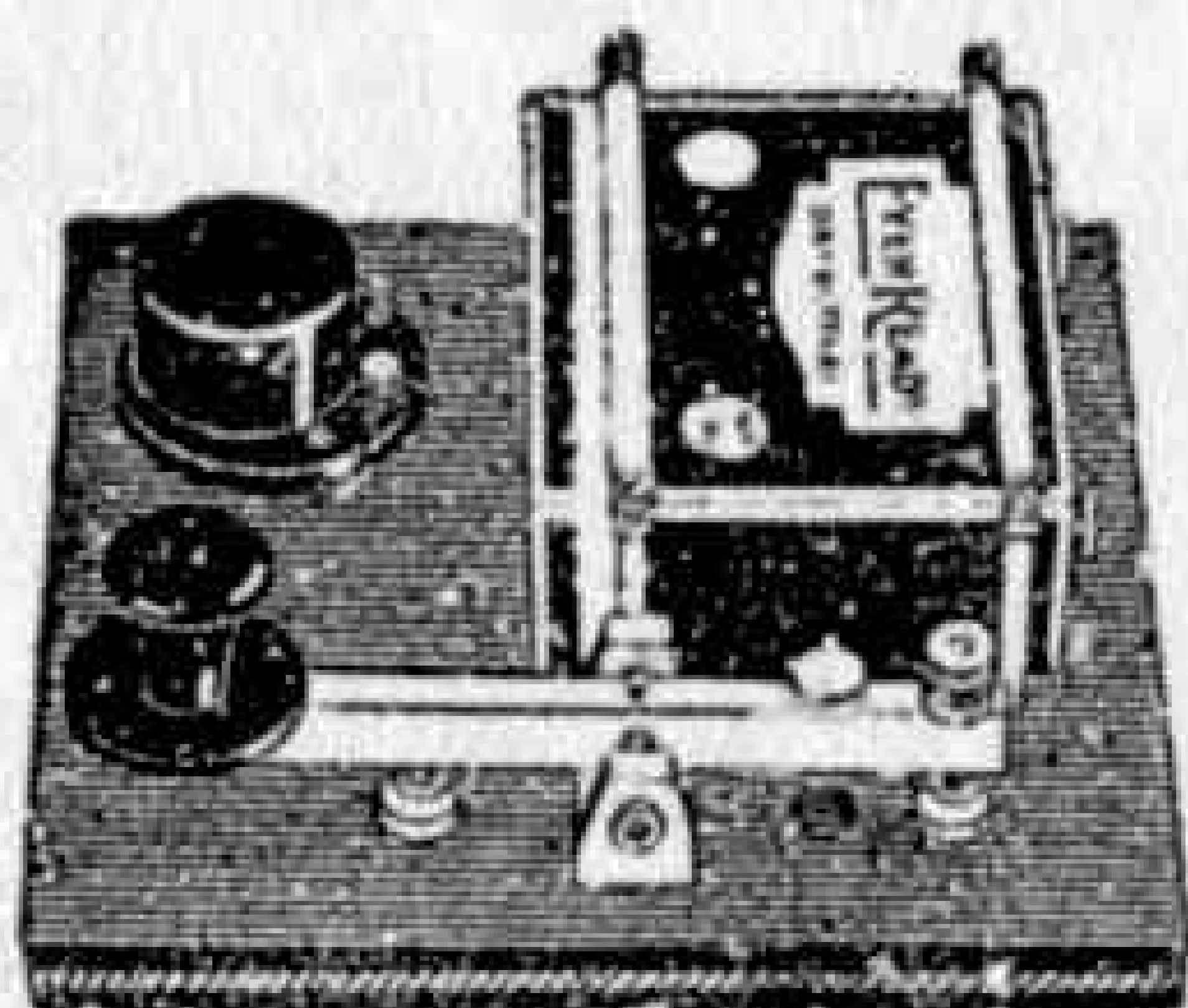
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MECCANO

MAGAZINE

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No. 8
August 1943

With the Editor

Topics for Our New Series

The short articles in our new series, "*Have You Ever Thought About This?*" have proved even more popular than I anticipated, and already many readers are demanding that I should extend the length to two or even three pages! Even if space were available, however, I do not think this would be a good thing, because one page seems just the right length for these informal chats.

This month's subject is of special interest just now and it solves a problem that must have occurred to many of us. Next month the topic will be engine horse-power — how this compares with the efforts of the "gee-gee," how it is calculated, and what the mysterious letters I.H.P., S.H.P., etc., really mean.

I shall be glad to receive suggestions for articles in this series. The subjects need not necessarily be connected with engineering in any form. The only requirements are that they must be of practical and general interest, not just scientific or technical problems or puzzles; and that they must be suitable for dealing with simply and without calculations or complicated diagrams.

Leaders in the War

Sir Bernard C. T. Paget

General Sir Bernard C. T. Paget was born in 1888 and educated at Shrewsbury School. He joined the Army in 1907 as a 2nd

Lieutenant in the Oxfordshire and Buckinghamshire Light Infantry, and in the war of 1914-18 he won the M.C. and D.S.O. for his distinguished services. He was Commandant of the Army Staff College in 1938-9.

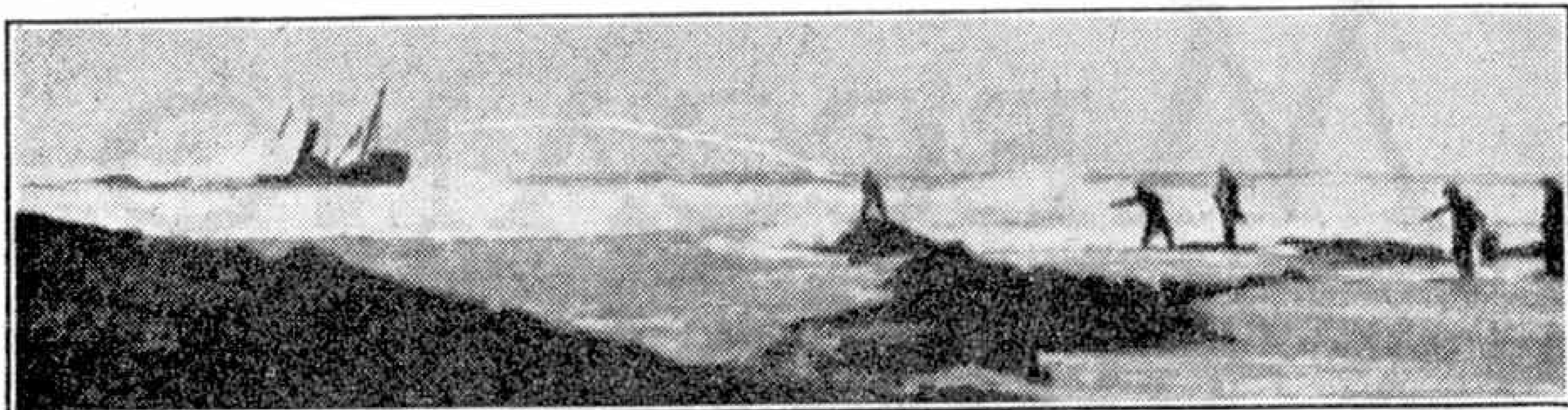
In the early stage of the present war he commanded the British and Allied force in the Andalsnes district of Norway, and in the withdrawal from that country in 1940 he evacuated his troops without losing a man. On his return to England he was made Chief of General Staff, Home Forces, and in 1941 General Officer Commanding, South Eastern Command. In December of that year he was

promoted to his present post of Commander-in-Chief, Home Forces.

General Paget's activity is remarkable. He not only insists on seeing things for himself wherever possible, but also takes every opportunity of getting into personal touch with his officers and men. He is definitely a "live" commander.



General Sir Bernard C. T. Paget, K.C.B., D.S.O.,
M.C., Commander-in-Chief, Home Forces.



As heavy seas wash over a stranded trawler off the rocky coast of Iceland, one of the rescue party who has waded out to a reef takes careful aim with the Schermuly Pistol Rocket—and with his first shot the line falls right across the trawler's decks.

A Life-Saving Rocket

The Schermuly Pistol Apparatus

THE year is 1899 . . . the scene a small but sturdy cottage on the North West Coast of Scotland. Inside the front room an oil lantern is swinging and smoking, as an occasional gust of wind is driven through a minute chink by the violence of the storm outside. The scream of the gale mingles with the dull, thundering boom of the great Atlantic rollers, and every now and then the whole building shudders.

Three oil-skinned figures are trying to peer through the window, and sometimes one of them goes to the door and listens intently. A fourth figure in the background is examining a strange assortment of ropes and pulleys.

Suddenly the door shakes to repeated kicking, and it is immediately opened to admit yet another muffled shape, who is half hurled into the room by the wind. He is sobbing for breath, and it is some moments before he can speak. When he does, it is as solemnly and tragically as if he were announcing the death of a friend—and indeed that is what he is doing. For to coastguards, all seafarers are their friends; and the greater their need, the better friend the coast-guard proves.

"We canna' do it, Jock," he declares. "The ship's over two mile awa', and the horses will be blown off the road."

"We can aye try," replies Jock shortly; and with no further word they seize hold of ropes, pulleys, and buoys, and force their way to an adjoining room where a steel frame and two great rockets are piled on a cart.

They are trying to take the Boxer rocket apparatus to a ship that is foundering lower down the coast, so as to rescue as many of the crew as possible with life-lines. But as they struggle with the 16-cwt. equipment that includes the breeches buoy, they know that no horses in the world could move against the storm and the darkness quickly enough. Indeed, it is five hours later, and dawn is bringing some abatement of the wind, when they reach the scene of the wreck. Far out on the rocks they dimly see the outline of a great ship broken in two; but of survivors there is no sign.

In those days the coastguards worked against almost insuperable difficulties. There were only 292 Life Saving Stations around the whole coast of Great Britain. The complete outfit at their disposal weighed four-fifths of a ton, and the only method of transport was by horse-and-cart. The rockets were set off by match and fuse, and often precious minutes had to be wasted changing a damp fuse, or striking and re-striking matches. Many a time, indeed, the coastguards had the horrible experience of seeing men a few hundred yards away drowned before their eyes. The fact that 226 people were rescued in the year 1899 is an enduring tribute to their courage, doggedness,

and indomitable spirit under conditions that were always difficult and often burdensome and dangerous.

The story of life-saving apparatus is one of the greatest in the history of the sea, and fittingly it is sprinkled with British names.

Surprisingly, the first person to invent a method of reaching a distant point by shot and line was not a sailor but a soldier—Sergeant Bell of the Royal Artillery, who as early as 1791 devised a method of firing a rope from a ship. Eighteen years later another soldier, Captain George William Manby, of Norfolk, invented his famous "life mortar," which threw a shot with curved barbs and a line that (sometimes) caught on the rigging or bulwarks of the vessel at which it was aimed. It is from this idea that the far superior rocket apparatus was evolved. Its great advantage was the very low trajectory of the rocket, compared with the high trajectory of a shot or barb; and the fact that since the power was in the missile and not merely in the charge, it was far better able to forge through wind and storm.

The best of the mortar life-savers was made by Captain D. A. Lyle of the U.S. Army, which was our ally in peace then as it is in war now. It weighed only 185 lb. and was simple to operate. It suffered from the disadvantage of all mortar projectors, however, and later experimenters, such as Trengrouse, Dennet, Carte, and Col. Boxer, all concentrated on the rocket. The last-named made the famous Boxer apparatus that is still used on our shores to-day—though, of course, the transport has moved with the times. Instead of a horse and cart, the heavy equipment is now loaded on a trailer, and many shipwrecks can be attended as quickly as a fire.

All the same, it was recognised by everybody that all heavy rocket apparatus has certain difficulties and limitations. First, it was often hard to fire the line from the shore on to a ship; second, the paper fuse of the rocket itself was easily damped, and matches often blew out in a storm; third, it was impossible to guarantee an accurate aim (for example, the wind might change while the fuse was still burning); and most of all, even with car and trailer there are many places on our coasts where it is quite impossible to haul up nearly a ton of equipment.

So far we have met military names in the history of line-projectors, probably because in earlier times it was the Army who were directly concerned with guns and explosives, so it is appropriate that the credit for the perfection of the rocket apparatus goes to a British seaman—the late E. Schermuly.

Schermuly had sailed too often himself not to know the vital importance to all seafarers of gear that would throw a rope quickly and accurately from their own ship to another, or to the shore. Once a light, strong line could be planted across the decks of



The Pistol Rocket has made contact with yet another doomed vessel, and the Breeches Buoy is being set up.

a drifting vessel, hawsers could be taken aboard and the ship towed to safety. Or if a line were shot from a sinking craft, the "whip"—two ropes on a pulley—could be pulled aboard from the rescue party and the breeches buoy speedily set up.

The best of all heavy rocket apparatus in use then was the Boxer, which is still doing valuable work around our shores; but it is obviously impracticable to have 16 cwt. of rockets, hawsers, buoys, and ropes on board, and expect to get them into action immediately on a sinking ship. Also, all paper rockets exploded by fuse suffered from the disadvantage that between the moment of the fuse being ignited—if it lit at all in a storm—and the rocket being set off, the ship probably would have keeled over, and the shot would miss. And you cannot afford to give the sea a second chance.

But sailors believe that difficulties are made in order to be overcome, and after years of research Schermuly perfected what is undoubtedly the finest piece of mobile life-saving equipment in the world—the Schermuly Pistol Rocket apparatus, which is used all over Great Britain to-day in conjunction with its big brother, the Boxer.

Instead of a projector with its 16 cwt. gear and 16 lb. rocket, there is a gun-metal pistol, rather like an old horse-pistol to look at, and made so that neither seawater nor damp air can harm it. The rockets are not paper-covered, but are of weldless steel, fitted with a direction bridle; and they are fired instantaneously by means of a small percussion cartridge fitted into the breach of the pistol. The total weight of the heaviest apparatus, which is used for vessels over 500 tons and has a range of more than 220 yards, is 60 lb.—and this includes the four $\frac{1}{4}$ -in.

ropes, 250 yards long, with a breaking strain of 400 lb. The complete set can be packed into a box a good deal less than 2 ft. square.

One of the men most concerned with life-saving apparatus is Captain V. S. Rashleigh, C.B.E., R.N., Chief Inspector of H.M. Coastguards and head of all the coastguards in Britain. Captain Rashleigh seems to embody in himself the entire tradition of what a British sailor *should* look like. Tall, robust, sturdy in mind and body, he looks at the world with calm blue eyes set in a weather-beaten expanse of face. From the 8th Floor of Berkeley House, looking over the heart of London, he controls the entire coast-guard service of Great Britain, and his friendly manner does not quite conceal his determination to do his job thoroughly. Ask him what his initials are and he will reply "Vinegar, Salt"—and very appropriate, too, for an old salt! . . . When he gave his initial as "V" for "Vernon" over the 'phone, he was always being taken for "B" for "Bernard"; so he changed to "Vinegar, Salt." And they've stuck!

This is what Captain Rashleigh has to say about modern life-saving apparatus: "Instead of the 292 stations you mentioned our having in 1899, we now have 405. They extend all round Britain from Balta Sound to the Scilly Isles; from Prussia Cove to Copt Point, and from Happisburgh to Tiree and Coll. The rocket pistol apparatus is installed at more than 100 of these points, and has given very fine service indeed. It was the first ever to be given a certificate by the Board of Trade as an approved life-saving appliance; and thousands of seamen must have benefited from it.

"Last year 458 persons were rescued from danger by the coastguard service, and, of course, there were probably even more rescues to the credit of the Royal National Life-boat Institution, with whom we always work in the closest co-operation, and to whom we give precedence if possible, since saving life is only part, though admittedly a most important one, of our day and night service."

From Captain Rashleigh's lips I heard the story of one of the earliest and most romantic rescues by the Schermuly apparatus. Perhaps more than any other single exploit, it helped to secure recognition of the rocket pistol, and to this day seamen still talk of it as a marvel among rescues by sea.

One winter night in 1932 the Fleetwood Trawler "*Craik*," of 279 tons, was washed ashore near Craighouse, on the rocky, storm-bound Isle of Jura, off the tip of the North West Scottish coast. Six men of the Craighouse (Cont. on page 286)



In a matter of minutes the Breeches Buoy apparatus has been set up between shore and ship, and the rescued sailors make the 200 yds. journey along the thin line that lies between them and death.

The Diesel Engine Locomotive

III.—The New Power in Practice

By D. Rebbeck, M.A. (Cantab.), A.M.I.Mech.E.

HAVE you ever been travelling in a train hauled by a steam locomotive and had the greater part of the view from the window hidden by a continuous cloud of smoke? Nothing is more annoying when making a journey by rail, and it is here that the Diesel engine locomotive makes one of its strongest appeals, because there is no smoke to obscure the view from the passengers or, what is more important, from the driver. The fitting of smoke deflectors to steam locomotives may be a cure, but prevention is better than cure!

In the steam engine objectionable smoke and exhaust steam are unavoidable, and add to this the fact that there is also grave danger of fire from sparks when using steam engines for shunting services in the neighbourhood of warehouses, etc. If we consider a fast passenger train travelling a distance of say 400 miles, and therefore consuming $8\frac{1}{2}$ tons of coal on the journey, we should do well to remember that between 2 and $2\frac{1}{2}$ tons of coal dust are forcibly ejected through the chimney and deposited on the surrounding countryside. As a matter of fact this quantity is more than the total amount of fuel that would be consumed by a Diesel engine locomotive of the same power!

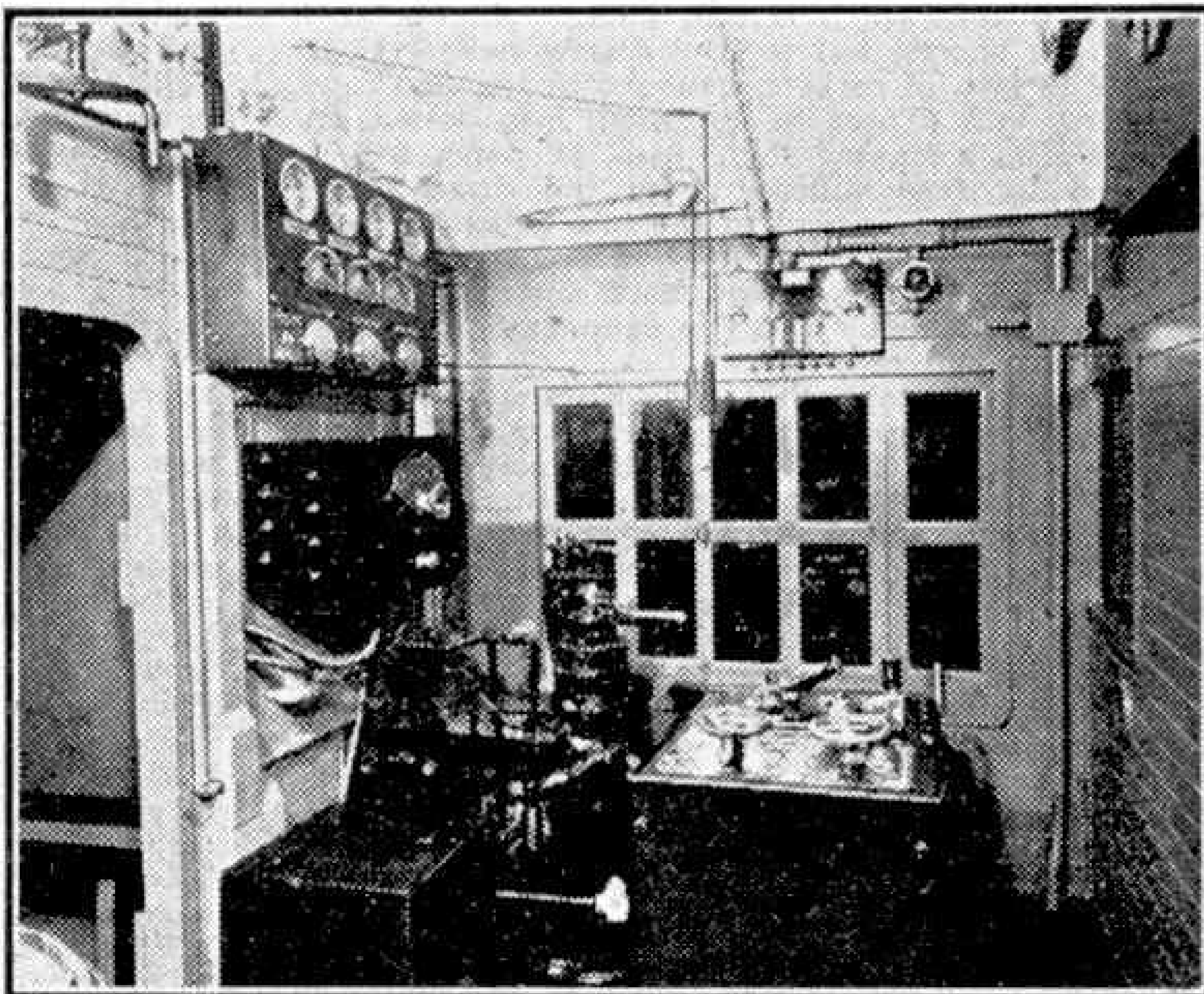
Now we come to the question of availability. The Diesel locomotive can be kept in continuous service for 16 hours per day or more if necessary. Only about 20 minutes is required every day for cleaning oil filters and inspecting connections and joints. As the engine is forced-lubricated and totally enclosed, very little cleaning is necessary. At the end of a journey or a day's run the locomotive can be left by the driver as soon as it stops. The steam locomotive requires the fires to be cleaned and banked or drawn before the crew can leave it. The engine needs about $1\frac{1}{2}$ hours daily to be got ready for service, with periodic cleaning of tubes and smoke-boxes and washing out of boilers. Added to this is the fact that a steam locomotive is usually limited to about 12 hours' service per day. The average mileage of a steam locomotive is about 111 miles per day, rising to 400 miles per day for engines on express services; whereas the comparative figures for the Diesel engine locomotive are 200 to 300 miles per day on local service and anything up to 800 miles per day on an express service.

Another interesting point in favour of the Diesel locomotive is where personnel is concerned, as it only requires two drivers to maintain a service of 16 hours per day, and if the locomotives are duplicated for heavy traffic no additional personnel is required. Against this the steam locomotive requires the service of a driver and a fireman working an 8 hours' shift for only about 6 hours' locomotive service. Two drivers and two firemen are necessary if the locomotive is kept in service for 11 or 12 hours per day!

When we come to make a comparison between Diesel and steam locomotives on the question of fuel consumption, we discover some even more amazing results. A steam locomotive hauling a fast passenger train burns about 47 lb. of coal per mile as against a mere $9\frac{1}{4}$ lb. of oil for a Diesel; the average local

steam train uses about 40 lb. of coal per mile, whereas the Diesel only requires 4 lb. of oil; a Diesel rail coach carrying 60 passengers, with frequent stops, uses about 2 lb. of oil per mile, and the steam-hauled rail coach of similar size requires 13 lb. of coal per mile. It is further to the advantage of the Diesel engine locomotive that it uses no fuel except when the train is actually running, and there is no wastage of fuel due to handling; whereas the steam locomotive uses coal while standing and getting up steam, and there is a considerable waste of fuel due to handling.

Some interesting figures were made available to the author before the war in connection with a Diesel-electric locomotive of 450 brake horse power operating on a main line service in Denmark. The



In the driving cab of a Canadian Pacific Railway Diesel engine shunting locomotive.

total distance travelled in a month was 6,500 miles with a mean train weight of 163 tons. The maximum running speed was 50 miles per hour and the total fuel oil consumed was 20,100 lb., or about 9 tons, which represents a remarkably small figure; this works out at 3.1 lb. of fuel oil per mile. The total distance by weight was 1,060,000 gross ton miles, which gave a fuel oil consumption per 1,000 gross ton miles of only 19 lb. These figures are really surprising, but quite authentic, being supplied by the Danish State Railways.

One of the most spectacular of modern railcars driven by Diesel engines was the German "*Flying Hamburger*." This streamlined train began its trials just over 10 years ago in 1932, and has since made many fast runs on the German State Railway, having attained a speed of 93 m.p.h. The maximum speed on the track is limited to 100 m.p.h. This lightweight car, in which even the buffers are streamlined, became a striking example of the success of modern efforts to attain higher efficiencies, and weighed only 77 tons with accommodation for 102 passengers, the length of each coach being 68 ft. The engine, a 12-cylinder "Maybach V," developed 410 brake

horse power at 1,400 r.p.m., and weighed only 10 lb. per b.h.p.

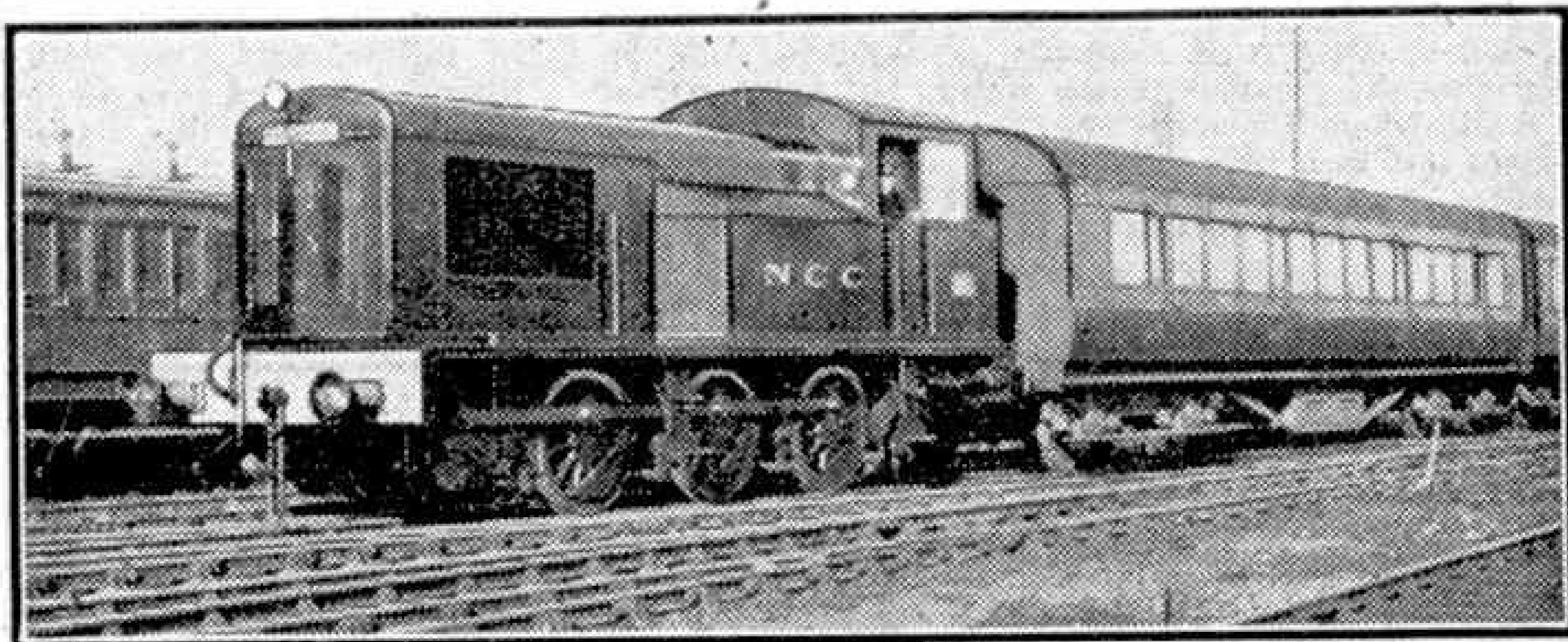
A typical railcar that is used extensively on the French railways has a seating capacity for 62 persons and a loaded weight of 35 tons. The power unit consists of two Saurer Diesel engines, each developing 130 b.h.p. at 1,500 r.p.m. and located in bogies at each end of the car. The power is transmitted to the driving wheels through a gear-box giving four forward speeds and reverse. Gear changing is effected through an oil pressure system which can be controlled from either cab.

An indication of how some designers attempt to avoid the electrical drive for the larger type of locomotive is shown by the 1,000 horse-power locomotive built in Germany by the Humboldt-Deutz A.G. The engine consists of three double-acting 2-stroke Diesel cylinders running at 250 r.p.m., directly coupled to the driving wheels. For starting, the cylinders are supplied with compressed air.

Diesel railcars are also used in Spain, as well as many other countries, and an example of one in use on a Spanish railway has seating capacity for 68 persons, of whom 16 are second class and 52 third class. The total weight is 37 tons and the maximum speed 55 m.p.h. There is a driving compartment at each end of the coach and heating is provided by the Diesel engine cooling water being circulated through the compartments. The Diesel engine develops 275 h.p. at 1,200 r.p.m. and the car belongs to the "Compania de los Ferrocarriles de Madrid a Zaragoza y a Alicante."

An interesting Diesel-electric shunting locomotive built for the Canadian Pacific Railway is No. 7000, an interior view of the driving cab being shown on the opposite page. This locomotive weighs, in working order, 107½ tons and has a maximum tractive effort of 60,000 lb. The railway gauge is 4 ft. 8½ in. and the minimum curve which the locomotive can take is 90 ft. radius. With the exception of the motive power equipment, the whole of the mechanical portion was built and erected in Canada by the National Steel Car Corporation of Hamilton, Ontario. The locomotive

measures 43 ft. 3½ in. overall and is 14 ft. 11½ in. from the top of the rail to the top of the cab. The overall width is 10 ft. The prime mover is a 6-cylinder single-acting 2-stroke Diesel engine built by Harland and Wolff Ltd., with an output of 550 b.h.p. at 600 r.p.m. The speed change stop-and-start gear is electro-pneumatic and the main generator is a totally enclosed unit manufactured by Laurence Scott and Electro-



A passenger and shunting Diesel locomotive built for the L.M.S. (N.C.C.)

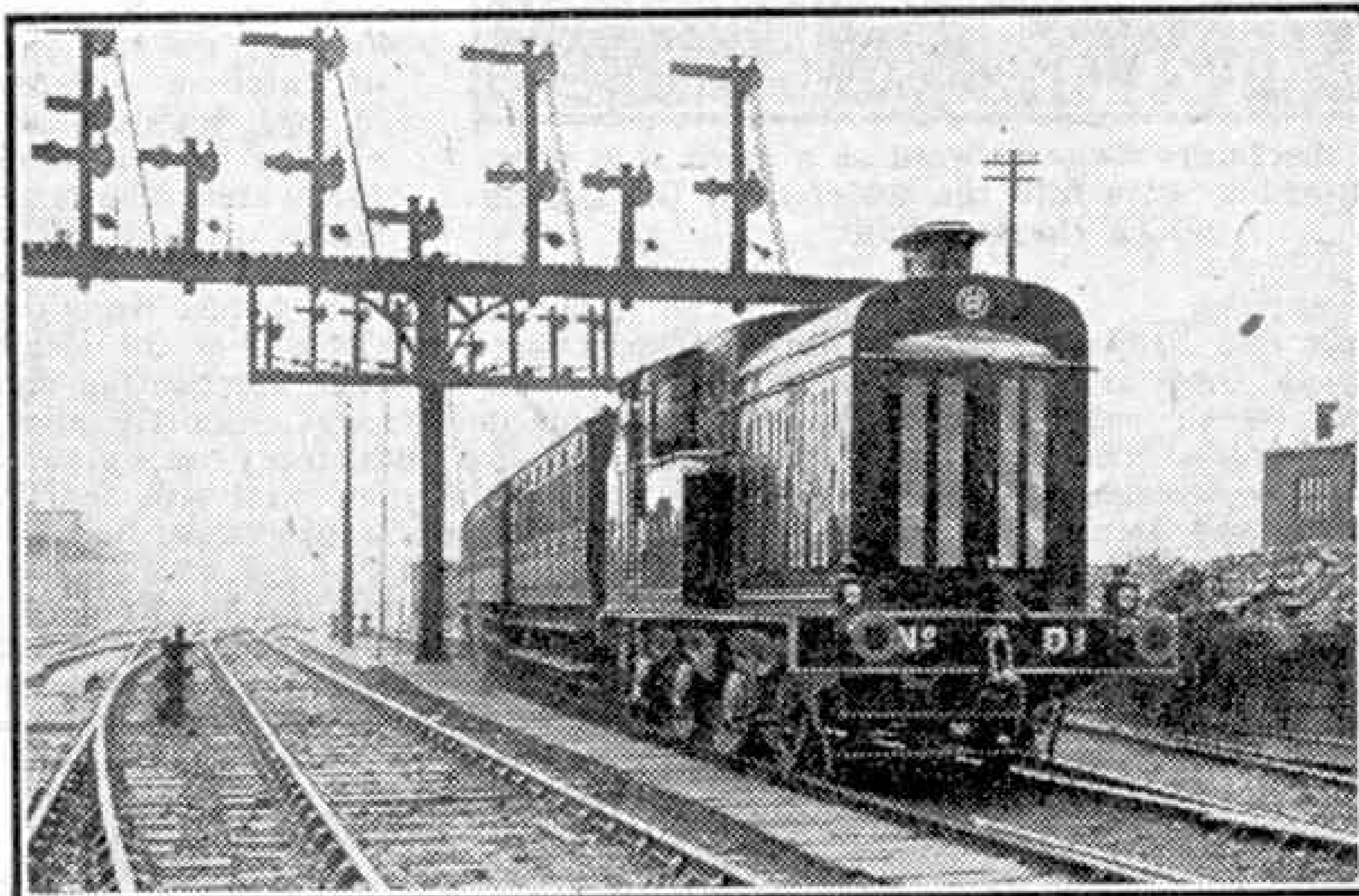
motors Ltd. The locomotive is fitted with a Westinghouse air brake and a hand-brake to the bogie under the cab.

The L.M.S. (N.C.C.) passenger and shunting Diesel locomotive seen in the upper illustration on this page is a very interesting unit, as the transmission embodies a two-speed reverse and reduction gear-box. The gauge of this railway is 5 ft. 3 in. and the minimum curve for the locomotive is 264 ft. The total weight in working order is just under 50 tons and the tractive effort is 24,000 lb. A speed of 50 m.p.h. can be reached when the locomotive is operating as a passenger engine, and 15 m.p.h. when it is on shunting work.

The Diesel engine seen in our last illustration is one which the Belfast and County Down Railway are operating on one of their branch lines, and it too has a maximum speed of 50 m.p.h. This locomotive weighs 33 tons and is a good example of the reliability of modern Diesel-electric drive, having been in operation now continuously for 10 years. It is powered by a Harland-B. and W. 8-cylinder 2-stroke Diesel engine developing 270 b.h.p. at 850 r.p.m. and is operated by single cab control for single unit operation. A "dead man's" pedal applies the brakes and the locomotive speed is controlled by variation of the generator voltage. The brake power is 42 per cent. of the total weight of the locomotive and the hand-brake is fitted to all wheels.

No article on Diesel engine locomotives would be complete without making brief reference to the Still locomotive, which runs on a combined Diesel and steam system. The heat produced in the Diesel part of the cylinder plus the heat of the exhaust gases is used to heat water contained in a jacket round this part of the cylinder. The steam so produced is used to help to work the steam end of the cylinder. To start the steam side, the steam boiler must be heated by burning oil underneath it, but once started the steam is normally kept up by the waste heat from the Diesel side.

It is hoped that the different examples of Diesel engine locomotives described will help to illustrate to the reader how this type of prime mover is becoming universally adopted on the world's railways.



A Diesel locomotive of the Belfast and County Down Railway.

Launching a Ship

By D. Rebbeck, M.A. (Cantab.), A.M.I.Mech.E.

THE average person is apt to regard shipbuilding as a rather incredible performance, and almost refuses to believe that it is humanly possible to slide an enormous steel hulk into the water, not only so that it floats when it reaches the water, but also so that it does not turn over en route.

In point of fact, launching is not such a mysterious business at all, and readers who have seen a ship launched will probably have noted, above all, that the whole affair seems to be carried through with the utmost smoothness. The ship literally glides into the water and becomes water-borne without any fuss other than the frantic hooting of the waiting tugs, and, right at the end, the heavy rumbling of the weighty check chains.

Some time before the date of the launch approaches, two long fixed ways are built below the bottom of the ship's hull, one on the port and one on the star-board side of the keel. They consist of long pitch pine timbers rigidly fixed to the ground of the building berth, and can be seen clearly in the foreground of the accompanying illustration. These fixed ways run parallel with the keel of the ship, and extend from the stem down into the water; and on them the cradles carrying the ship will slide and take her safely down to the water. They are built at the necessary angle to ensure that the ship will slide into the water unaided and without any outside force being applied.

After the fixed ways have been built and firmly secured in position, the sliding ways, as they are called, that is the pitch pine timbers which will slide down the fixed ways, are also assembled beneath the ship, and at the same time the wooden cradles which are shaped to carry the curved stem and stern of the ship are built up. In our illustration the bow cradle can be seen under the fore part of the ship's hull, and it will be noticed how it is carefully shaped to take the bows of the ship. The nature of these cradles depends of course upon whether the ship has fine or full lines, and for a large liner they are enormous structures.

It will be appreciated that, when a ship starts to slide down the slip, the frictional resistance will be very great, and although the declivity of the slip will help to overcome this force, the necessary

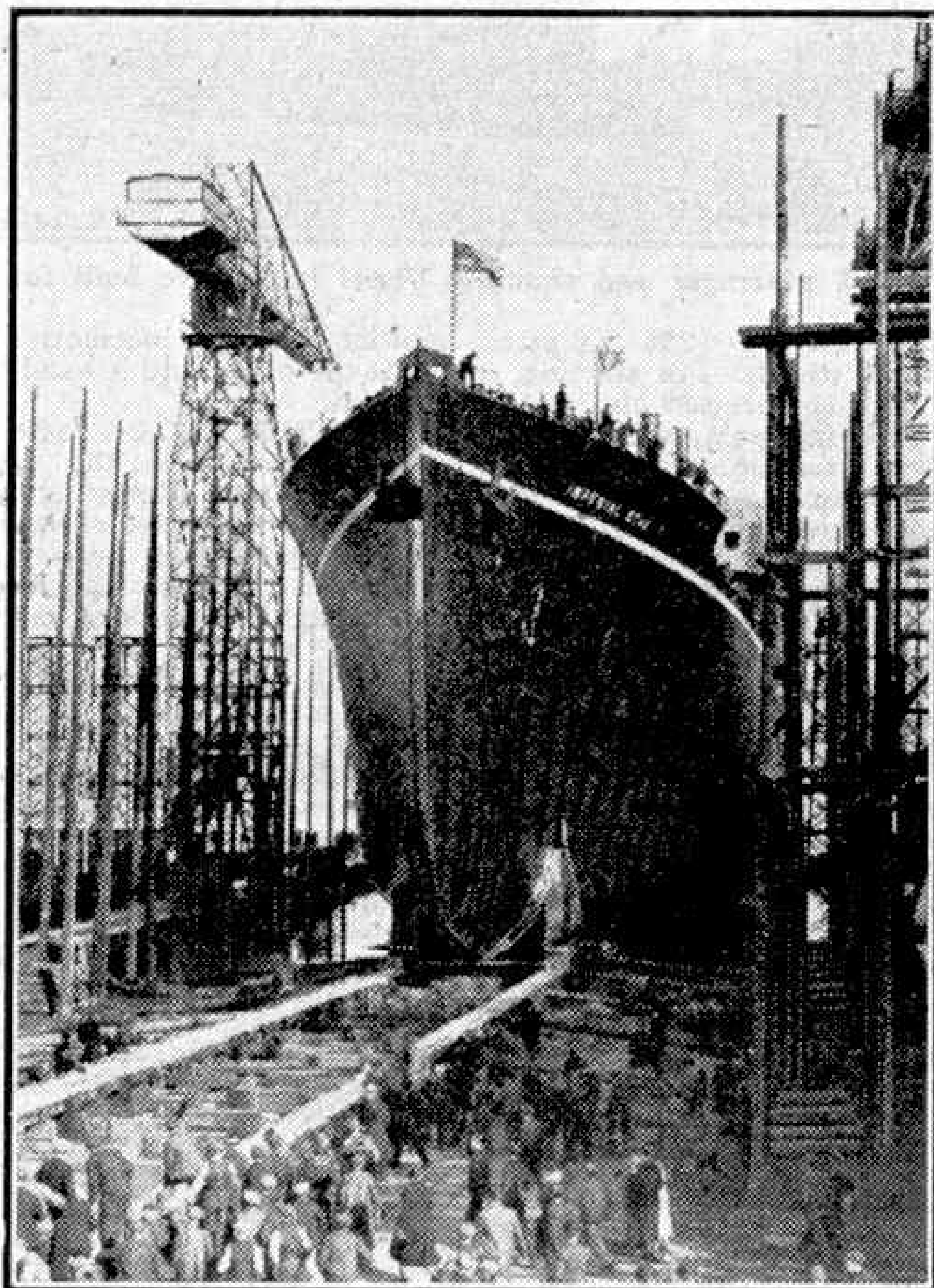
lubricant must also be supplied. The grease used to provide a smooth sliding surface is a mixture of tallow, soft soap and oil, and this mixture is liberally applied over the whole length of the launching ways. By this means the ship is enabled to slide smoothly down the slip and into the water.

As the time for the launch approaches, the weight of the ship is gradually transferred from the building blocks and timber shores to the launching ways,

and this process continues until just before the launch. Then the few remaining shores are moved in a pre-determined order, until finally the whole weight of the ship is resting on the sliding ways which, in turn, rest on the fixed ways. The ship is prevented from starting off too soon by a special trigger gear which is not released until the exact minute of launching is reached.

The great moment arrives. The bottle of wine is released and falls to smash itself on the vessel's bows; the trigger release gear is cut out and the ship begins to move, almost imperceptibly at first, then slowly gathers speed and majestically glides down the ways to become water-borne.

Our illustration has caught all the excitement of the launch. The ship is well down the ways, and the crowds of workers and spectators surge forward on the slip to catch a glimpse of her making her curtsy as she takes the water. The flags flutter proudly in the breeze, the ribbon



Workers and spectators surge forward as a great ship slides down the launching ways into the water from the slip on which she was built.

which carried the christening bottle hangs from the port anchor, the launching crew peer over the ship's sides, and out in the basin the tugs are hooting and anxiously awaiting their new charge. Shortly after, the slip takes on a derelict and empty appearance; but not for long, for another new keel will shortly be in position, and then the whole process of building and launching will be repeated.

A close inspection of the photograph will reveal many interesting details, including the neatly piled shores on each side of the slip, the carefully constructed cradle, the massive tower cranes, which are such a conspicuous feature of a shipyard, the timber stage poles and other items.

And so, with little fuss and often no ceremony, a large cargo liner slips into the water, soon to begin her useful career on the high seas, which to-day is essential to the very existence of our country.

Have You Ever Thought About This?

IV.—Why Do Aero Engines Need "High Octane" Fuels?

EVERYONE knows that when a petrol engine is running it gets very hot, so much so in fact that a cooling system has to be attached to it to take the heat away, otherwise it would soon be seriously damaged. Now all this heat represents a great deal of energy, which has come in the first place from the petrol as it burns in the cylinders. So the petrol, in providing motive power, also produces heat at the same time, and the more energy that goes in heat the less there is available to drive the engine.

If we could develop an "ideal engine" all the petrol would be used in providing motive power, and no heat would be produced at all. Such an engine would be said to be "100 per cent. efficient" because there would be no losses. In practice, however, it is impossible to avoid the production of heat, so the problem is to make it as small as possible. Of every gallon of petrol the engine uses, more than half goes in making this waste heat, so it is very desirable that we should try to reduce this loss, and so leave more petrol for producing motive power. In other words, we want to improve the "efficiency" of the engine.

It has been found that one of the ways by which the efficiency of a petrol engine may be increased is to raise what is called the "compression ratio." This can be described as follows. When the piston is right at the top of its stroke, there is a small space left between the top of the piston and the cylinder cover. This is called the "clearance volume," which we will label V (Fig. 1). Now when the piston is right at the bottom of its stroke, this volume has increased to its largest value, which we will call V^1 (Fig. 2). If we divide V^1 by V we get the compression ratio. In petrol engine design the tendency is to increase the difference between V and V^1 .

Increasing the compression ratio,

however, leads to other difficulties, which have to be solved before the engine will give a satisfactory performance. In particular, if an ordinary petrol, such as that used by motor cars to-day, were supplied to a modern aero engine, this would run very unevenly and with a great deal of "knocking," which sets up very great stresses in the engine, and is very detrimental to it. This is because ordinary petrols will not stand up to conditions resulting from a high compression ratio; instead of a smooth combustion in the cylinder, the fuel burns very unevenly, giving rise to excessive pressures, greater than those which should normally occur.

As a result of this, chemical engineers had to carry out research to produce a fuel capable of withstanding these new conditions. They were very successful. The range of high octane aviation spirits that we know to-day came into being, and so the latest type of aero engines are able to carry the aeroplanes faster and farther than their predecessors would on the same amount of fuel.

The term "high octane" is derived from what is called the octane scale, which is simply a means of comparing the anti-knock properties of different fuels. There are two substances, neither of which is actually used in practice as a fuel, called normal heptane and iso-octane. Normal heptane is very liable to knock, but on the other hand iso-octane has very good anti-knock properties. Accordingly,

by mixing the two, we may obtain a fuel whose anti-knock qualities will depend on the relative proportions of the two substances.

Suppose someone produces a new petrol and we want to find its octane number. Then we run a standard engine on the new fuel and note the knocking which occurs. Next, by trial and error we mix normal heptane and iso-octane together until we have a mixture which produces the same amount of knocking (Continued on page 286)

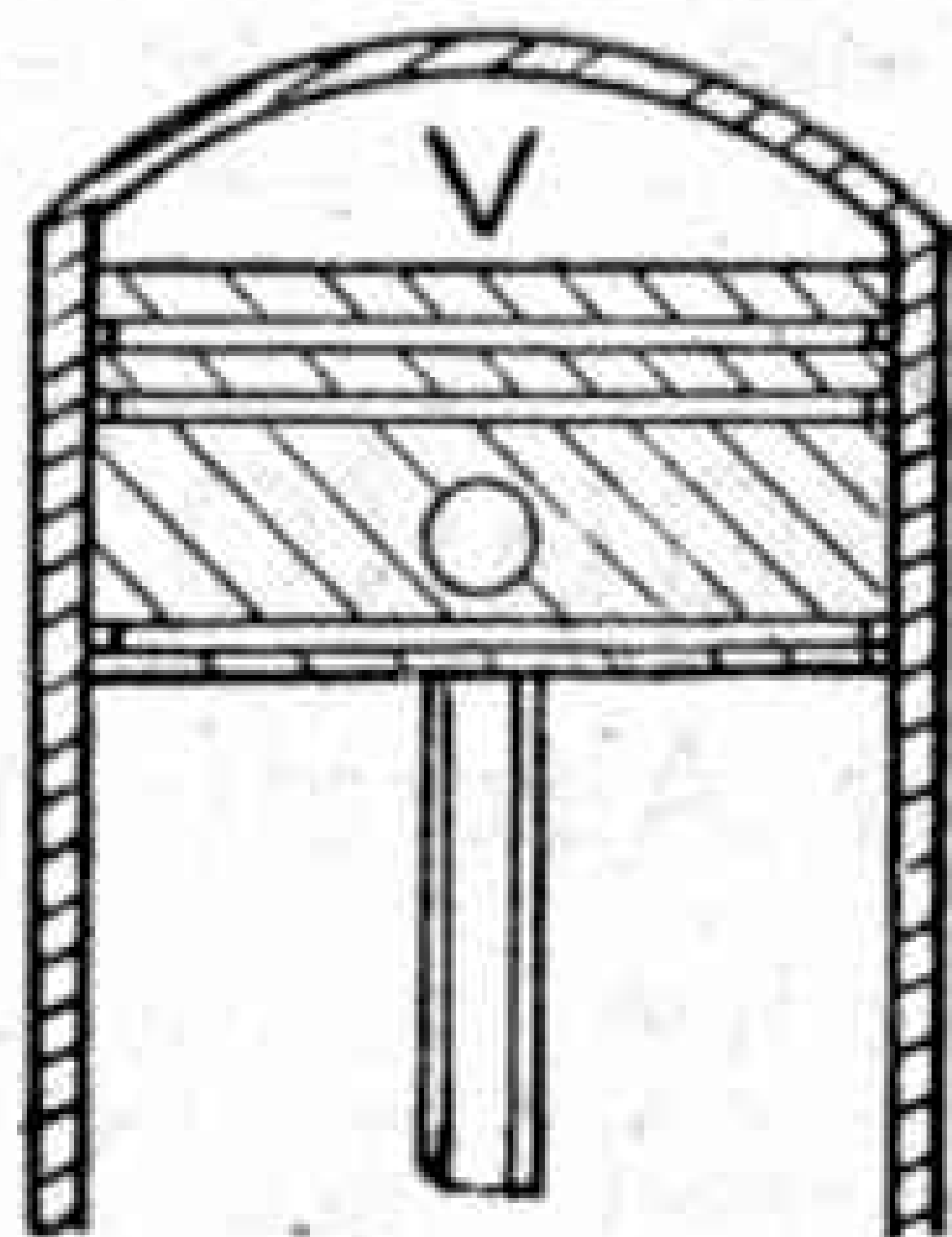


Fig. 1.

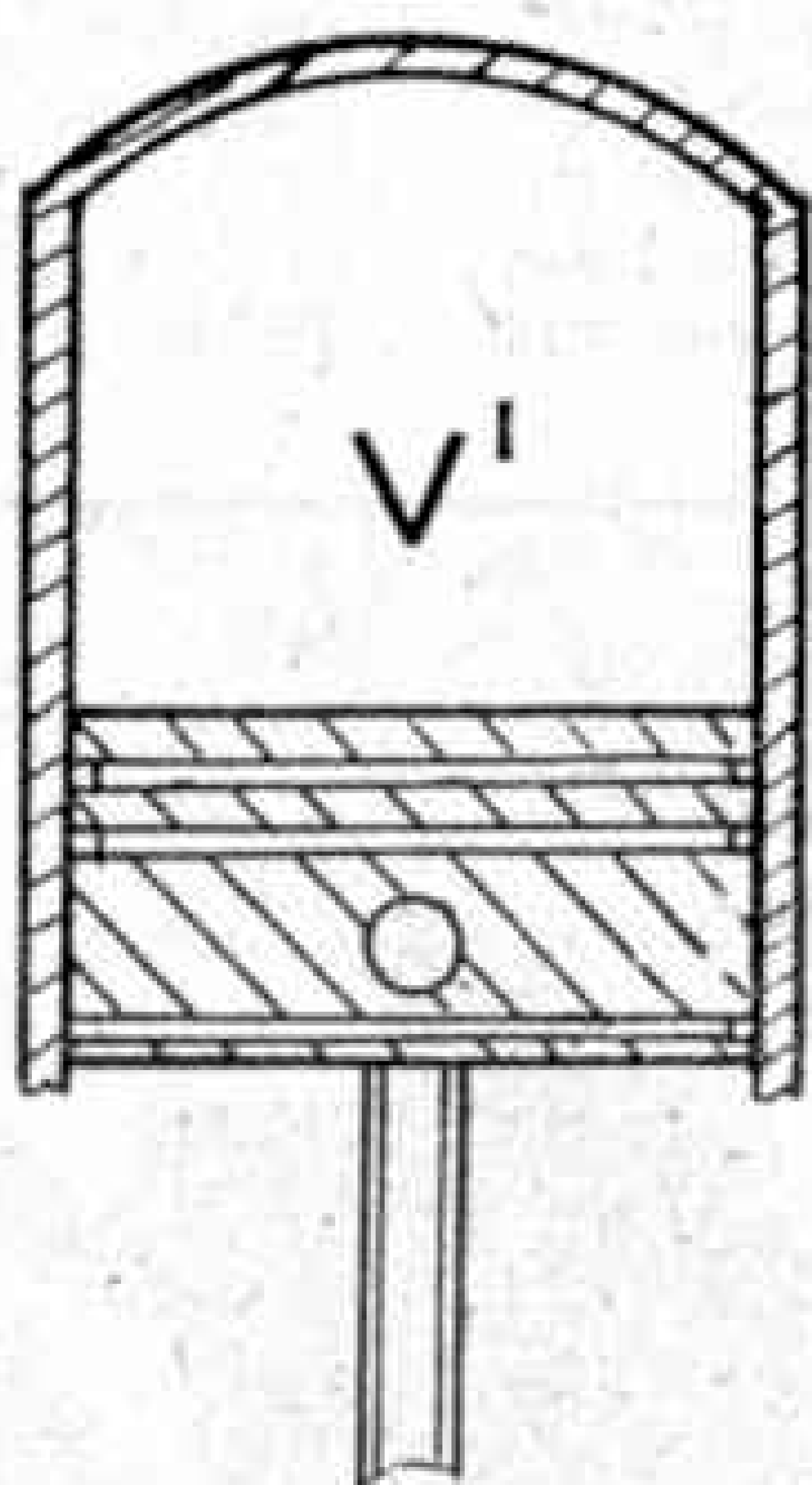
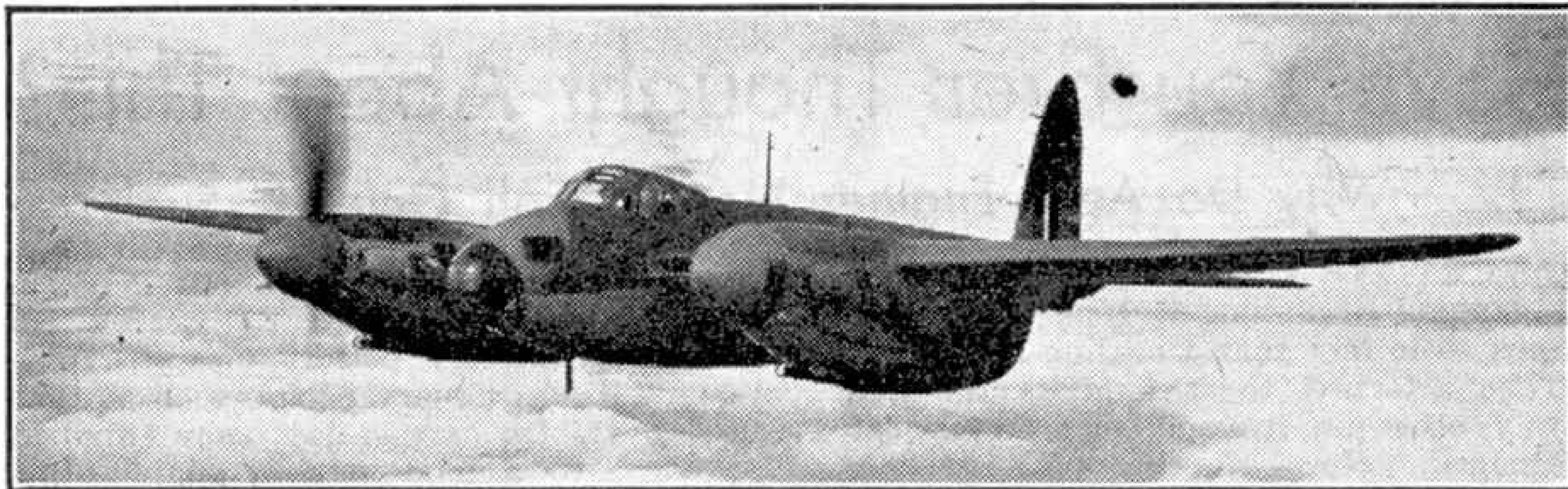


Fig. 2.



D.H. "Mosquito" bomber. The bombs are carried in a special bay in the fuselage.

D.H. "Mosquito" Bomber

The Fastest Aircraft in Service

IMPORTANT new details of the de Havilland D.H.98 "Mosquito" have been released since our article on this fine machine in the "M.M." of April last. Most outstanding is the fact that the "Mosquito" is the fastest aircraft of all types in service in the world. Its top speed and its range cannot be disclosed, but "Mosquitoes" have been flown from this country to Moscow in time for lunch, and flown back again the same day. Enough fuel is carried for a non-stop flight to Berlin and back with nearly a ton of bombs as has been proved by the several "Mosquito" raids on the German capital.

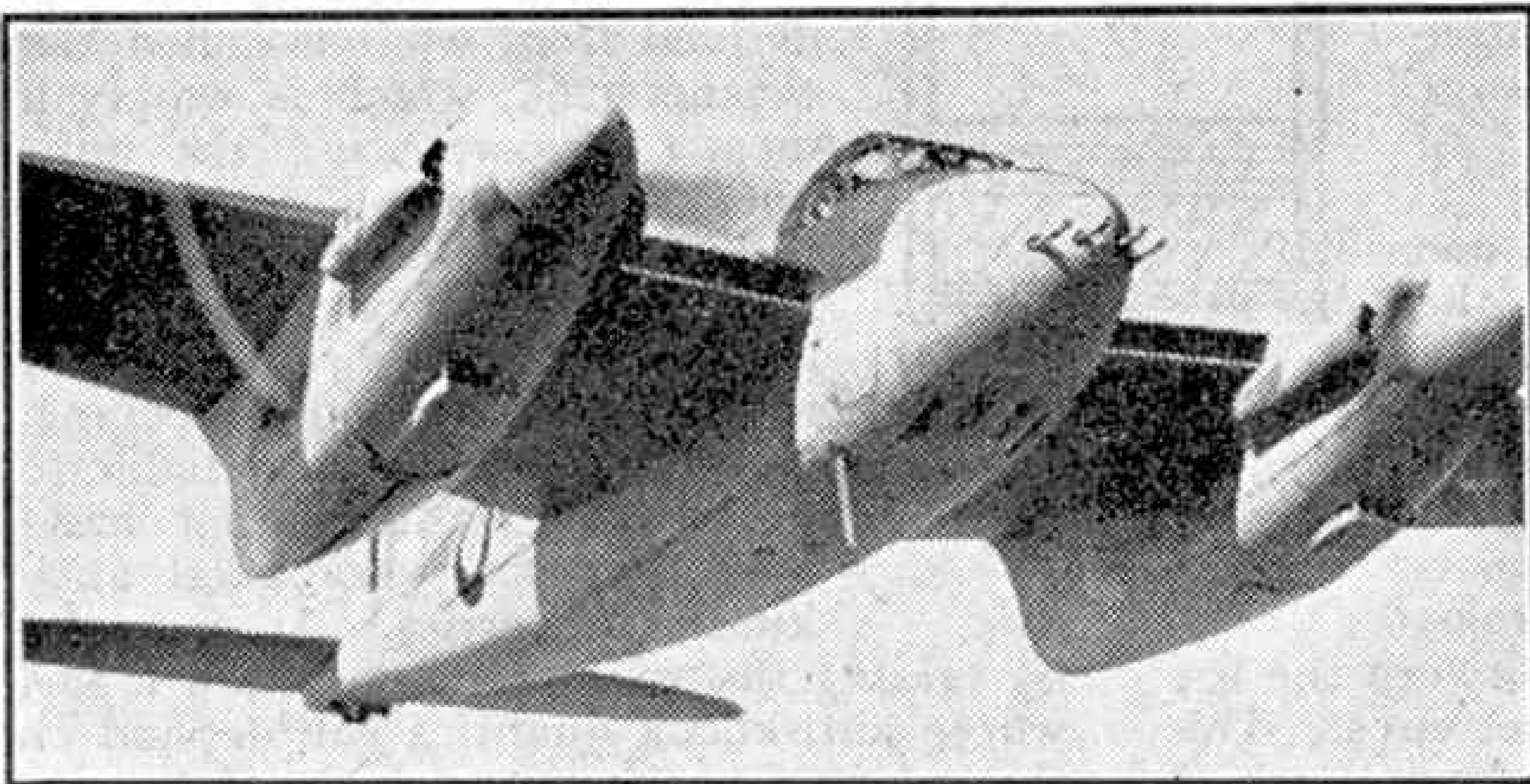
There are several versions of the machine in service with the Royal Air Force, including the "Mosquito" II long-range fighter, armed with four 20 mm. cannon and four 0.303 in. machine guns; the "Mosquito" III trainer, with dual control; and the "Mosquito" IV long-range bomber, unarmed but carrying a 2,000 lb. bomb load inside the fuselage. In addition the machine is being employed on reconnaissance duties of various

of 4,587 D.H.4s had been built there. A development was the D.H.9, of which about 250 per month were being built at the Aircraft Manufacturing Co. Ltd., Hendon Works, when the war ended.

The "Mosquito" is the first de Havilland war aircraft to be put into production since those days of 1918, and is the only entirely new operational aircraft, British or American, to have been designed since the present war began and used extensively against the enemy. The technical team responsible for the "Mosquito" is headed by Capt. Geoffrey de Havilland, who designed his first aeroplane in 1908 and completed its construction the next year. After that he designed and built other and better machines in fairly rapid succession, and several of those he created after joining the Aircraft Manufacturing Company, forerunner of the present de Havilland firm, in June 1914, were among the most successful and most extensively used aircraft types in the 1914-18 war. At the time of the Armistice two of these types, the D.H.9 single-engined and D.H.10 twin-engined bombers, were being produced at the Company's main factory at a rate exceeding 250 a month.

This de Havilland team conceived the design formula of the "Mosquito" in the first few weeks of the present war. The idea was to create around two Rolls-Royce "Merlin" engines a small bombing aircraft with useful range and bomb load, which would be faster than contemporary fighters. The fighter version was a natural development from the bomber version. The Company were allowed by the Air Ministry and Ministry of Aircraft Production to proceed with the design work free from any Air Ministry specification, and although they were given several changes of in-

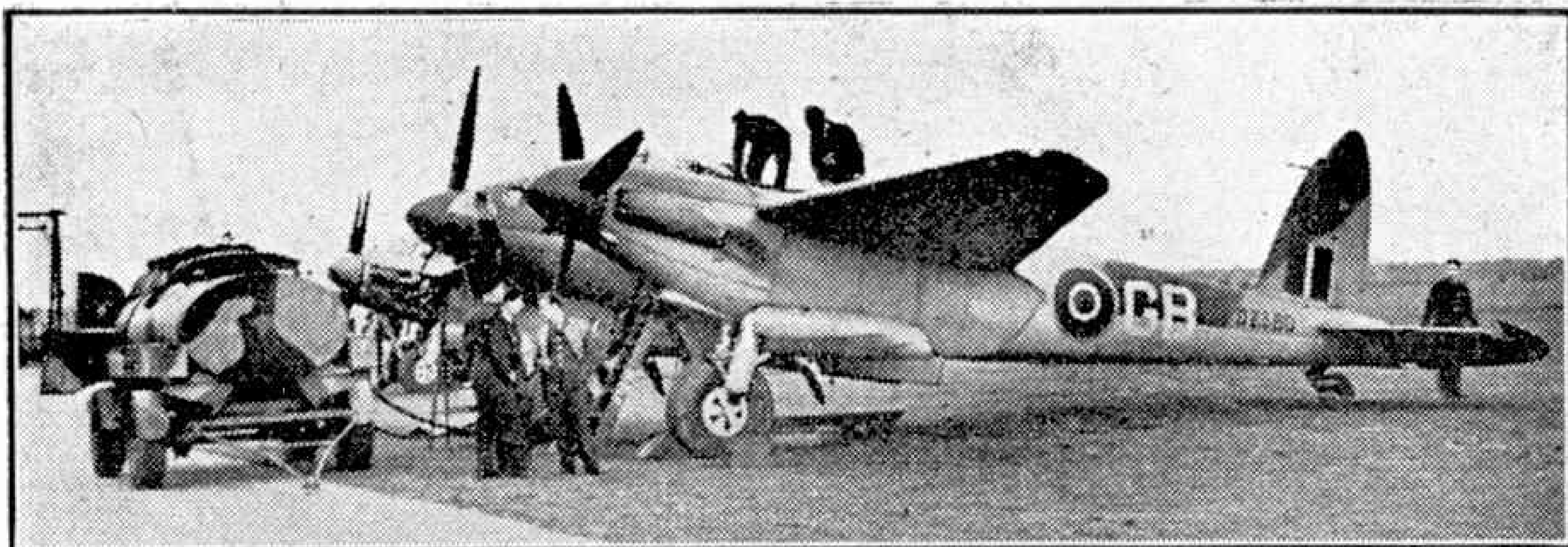
struction as to how the first few machines ordered were to be finished—which meant building and flying several fighter and bomber prototypes—the flight trials began 11 months after the start of design work, went straight through without a hitch, and the "Mosquito" was actually in operation against the enemy within 22 months from the start of design;



The fighter version of the "Mosquito," showing the four .303 in. machine guns, and the four oval openings under the nose through which the 20 mm. cannon are fired. The photographs on this page are by courtesy of The de Havilland Aircraft Company Ltd.

kinds and as an intruder.

It is interesting to recall that in the war of 1914-18 the D.H.4 day bomber, introduced in 1917, was the fastest machine of its type at that time. It had a 375 h.p. Rolls-Royce "Eagle" engine and a top speed of 143 m.p.h. This machine was also produced in the United States, and by the end of 1918 a total



Refuelling a D.H. "Mosquito" bomber. The open bomb doors can be seen underneath the fuselage. Photograph "The Aeroplane" copyright.

this is claimed as a world record.

The "Mosquito" first went into service as a day bomber, and carried out a bombing raid on Oslo on 25th September 1942. At the end of January this year came the more sensational news that "Mosquitoes" had carried out the first daylight raid on Berlin. Since then they have re-visited the German capital several times, and have continued the remarkable series of daylight raids upon targets in enemy-occupied countries which they began last year. They have also done considerable work at night, in bomber and intruder roles, and their design lends to extreme versatility of purpose.

The "Mosquito" is of wood construction. This material was decided upon in preference to metal as it enabled the design and prototype stages to be got through more quickly, and the machine put into production as speedily as possible; and also to utilise new material supplies and skilled woodworkers then available for employment. Other things that counted were the Company's long experience in the design and production of wooden aircraft, and the fact that in the event of a forced descent on the sea a machine thus built has greater buoyancy than one of metal—"Mosquitoes" have floated for many hours.

Also wooden construction lends itself remarkably to dispersed production. Furniture and other wood-working factories, large and small, have turned over to "Mosquito" work, and in Britain alone the de Havilland Company have scores of dispersed depôts and some 400 sub-contractors making components. Production of this machine therefore is a striking example of the Dispersal System referred to by Mr. C. G. Grey in his description of a modern aircraft factory, in the May 1943 "M.M." A similar situation exists in Canada, where completed "Mosquitoes" are being turned out of the big de Havilland works there. The de Havilland Company claim that no other aircraft has such widely dispersed production.

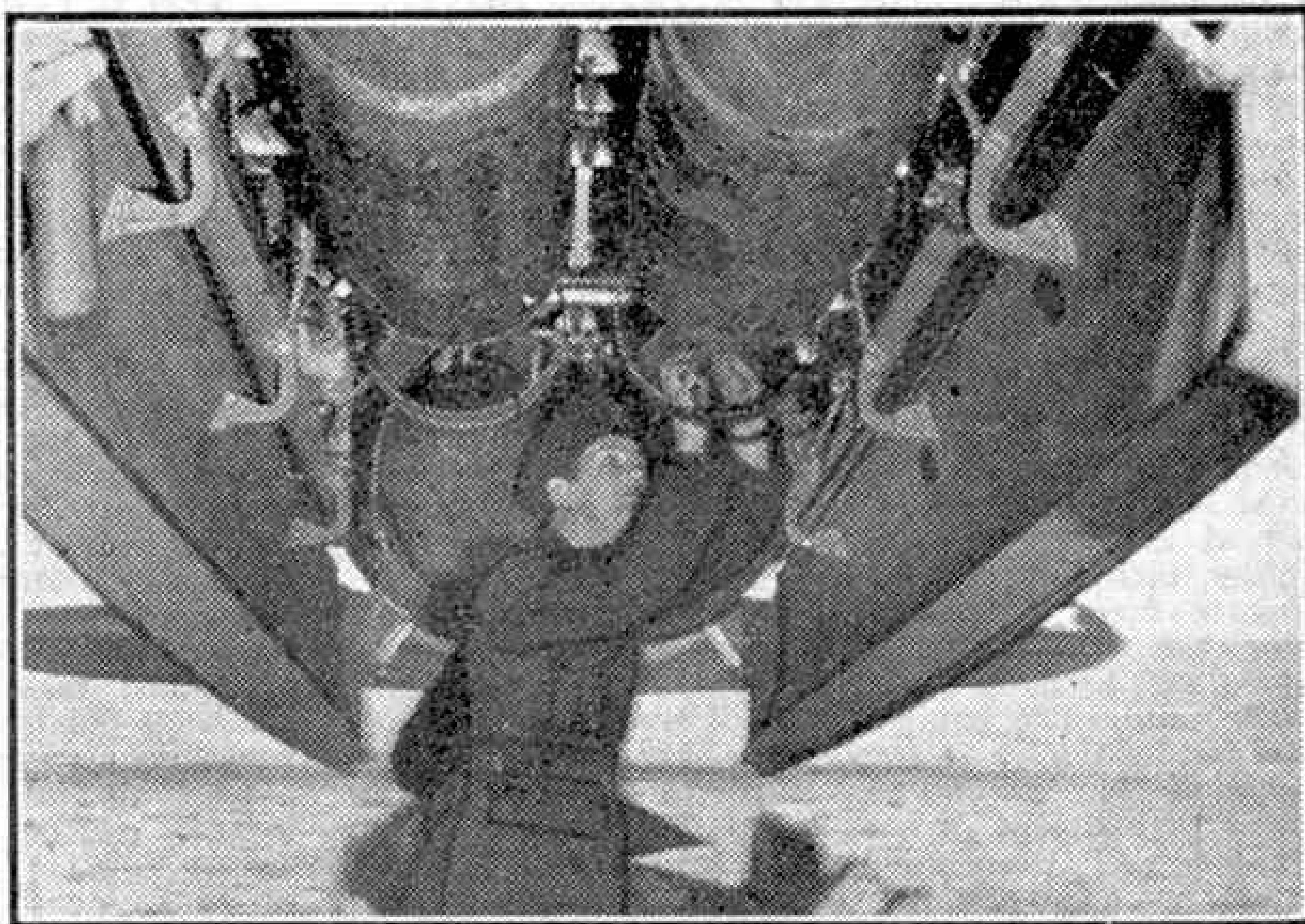
The graceful lines of the "Mosquito" belie the grim purposes for which it was designed. In form it resembles the "Albatross" air liner and the famous "Comet," of which it is a direct descendant. It is a middle wing, twin-engined monoplane, with the wing trailing edge swept back sharply, giving a pronounced taper toward the tips. The wing is built as a one-piece structure in a vertical jig, and its upper surface has a double covering consisting of two plywood skins spaced apart by spruce stringers fitted spanwise. The

wing carries the engine nacelles and the radiators. The rounded tips are separate components and are attached to the wing after the navigation lights have been fitted in them.

The fuselage is constructed in two halves, which might be called port and starboard respectively as division of the fuselage is along the vertical centre plane. This system of split construction greatly simplifies the job of installing the electrical wiring and other internal equipment, and as much as possible of this work is done before the two halves are joined together. The fuselage also has a double skin, with balsa packing between the two plywood skins. The complete fuselage is lowered upon, and secured by four pins to, the wing, and finally is covered with fabric and coated with dope.

The cockpit is level with the wing leading edge, and has seating for a crew of two, the pilot on the left and the observer on his right and slightly behind him. The bomber version of the "Mosquito" has a transparent nose, in the underside of which is an optically flat panel through which the observer, when acting as bomb-aimer, looks to obtain an undistorted view of his target. The cockpit of the bomber is fronted with a Vee-shaped windscreen that has two layers of glass between which a current of dried air is made to flow to prevent mistiness or icing. The bomb load of up to 2,000 lb. is carried in a special bay in the fuselage centre section, under the wing.

The "Mosquito" fighter has (Cont. on page 286)



Fitting bombs in a "Mosquito."



S.R. "Merchant Navy" Class 21C 8 "Orient" leaving Waterloo with a West of England train after the naming ceremony. Photograph by courtesy of the S.R.

Railway News

"Tilbury" Tanks of the L.M.S.

We have from time to time referred to the wanderings of the L.M.S. 4-4-2 tank locomotives originally belonging to the "Tilbury" Section, mostly as a result of their partial supersession by the Stanier 2-6-4s. The illustration on page 263 showing one of these Tilbury engines on its native metals therefore is of special interest. It shows some of the more notable rear-end characteristics of these hard-working 4-4-2s, such as the rounded cab, the cut-away corners of the buffer beam and the mounting of the guard irons on the outer face of the latter. The destination board, another feature of Tilbury practice, is prominent and the wording indicates also the route of the train.

The large-boilered "Tilbury" 4-4-2 design was developed in 1908 from preceding series of smaller but always effective engines. Various modifications in details of design and outline followed the absorption of the original London, Tilbury and Southend line by the Midland Railway in 1912. Even since grouping additional engines of the same design were built between 1923 and 1930, thus showing the special adaptability of the design to the conditions on its parent system.

Another detail of interest that shows below the coupling on the locomotive is part of the apparatus required for the magnetic system of automatic train control that has been installed on the "Tilbury" line. The first four coaches on the train are original L.T. & S. stock.

A Fine New Locomotive Shed

A new locomotive depot has been brought into use in the North Midlands by the L.N.E.R. It covers an area of 21 acres and has accommodation for 100 engines, including electric locomotives, if needed. A separate fly-over track enables inward engines to enter the shed without interference with traffic passing on the main lines, with which it is connected at each end. The equipment is of the most modern type and includes a 70-ft. vacuum-operated turntable, a coaling plant of 300 tons capacity that can fill a tender with 8 tons of coal in 3 min., an electrically powered wheel drop and hoist, a large water storage tank, repair pits under engine roads 400 ft. in length, centrally heated offices and commodious messrooms.

Getting a Start

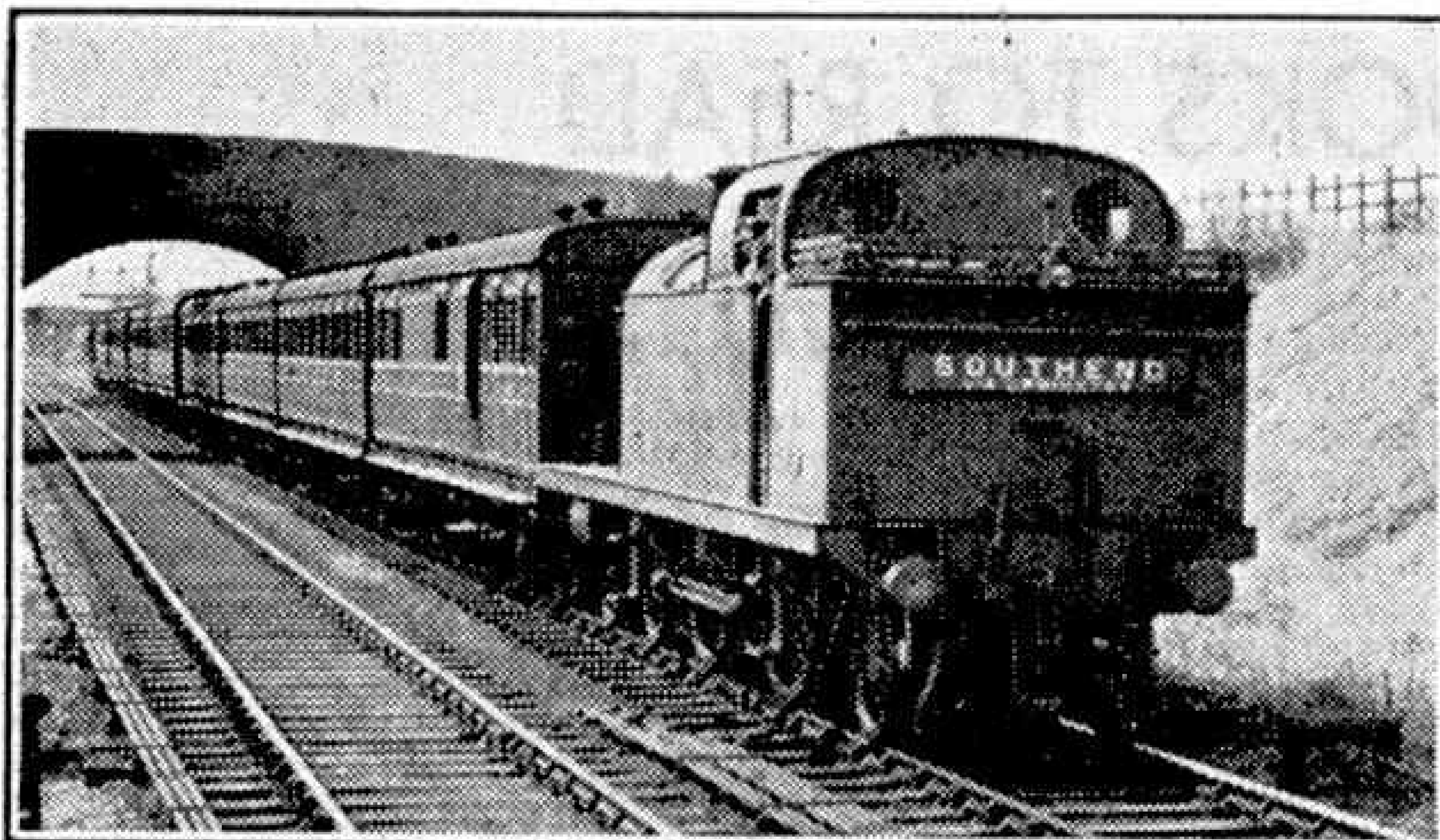
Abnormally heavy wartime passenger and goods trains have necessitated the provision of assisting engines in rear on starting, or when ascending steep inclines, to a greater extent than in normal operating conditions. All northbound L.M.S. expresses are now booked to stop at Beattock station, on the former Caledonian main line, in order that an uncoupled "pusher" can come on in rear. This helps as far as the summit of the 10 mile bank, the gradient of which is 1 in 75, and there it drops off and comes under the direction of the signalman, as at other places in various parts of the country. An exceptional method is employed on the L.M.S. route outside Bristol, where if necessary a banking engine is turned out on to the main line immediately a heavy starting train has passed; it gently catches up and pushes on the steep ascent to Fishponds. Speed is very low and a curve enables the two sets of enginemen to see what is going on.

Just to aid the train engines to get the enormous 600-700 ton expresses of the East Coast Route on the move more quickly, rear end assistance is frequently given for a few coach lengths at principal stations on the G.N. and N.E. sections of the L.N.E.R. At King's Cross, York, Darlington and Newcastle electrical devices have been erected to facilitate this process. When signals are off and the right-away is to be given, the Platform Inspector presses a plunger that causes indicators near the inner and outer ends of the main platforms to light up with an "R." On seeing this, the drivers open their regulators almost simultaneously and the noisy normal procedure of exchanging "Crow" whistles is avoided.

A refinement that has been in use for a number of years at the large N.E. area stations is the giving of the right-away signal to drivers by means of loud electric bells fixed on posts near the outer ends of platforms; these are operated by pressing buttons near the centres of the stations. Thus with no whistling or waving of flags a train with up to 20 coaches on and perhaps with an assisting locomotive in rear, can be started smoothly without fuss.

L.M.S. Locomotive Notes

Some new "5P5F" Stanier 4-6-0 6 ft. mixed traffic locomotives are at work, numbered from 5472 up.



Bunker first to Southend! One of the typical "Tilbury" 4-4-2 tanks of the L.M.S. on a stopping train. Photograph by W. S. Garth, Luton.

Further "8F" standard 2-8-0s numbered 8602, 8610 and 8625-7, have been built at various Southern Railway works. The latest seen ex Crewe is No. 8169. Engines of this type are on loan to the G.W.R., as also are some standard "3F" 0-6-0T, Midland 0-6-0s and small ex-L.N.W. passenger tanks with some former Midland 0-6-0Ts. Since 1939 30 more class "4F" 0-6-0 freight locomotives have been constructed, so raising the total of this largest British single class to 772 of the one L.M.S. type.

Class "4P" 4-6-2Ts numbered 15350-61 are all still seen in their original Glasgow district. They were built in 1916 for the former Caledonian Railway by the North British Locomotive Co. Ltd., with 5 ft. 9 in. driving wheels and outside cylinders of 19 in. diam. and 26 in. stroke. Steam pressure is 170 lb. per sq. in. and a moderately sized superheater is fitted. They present a rather squat appearance and are generally of somewhat smaller dimensions than the Brighton 4-6-2 express tanks illustrated and described in the June issue.

Although superseded to a very great extent by standard L.M.S. engines, former L.N.W. locomotives are still seen performing useful work and it was interesting during a journey past Stafford and Crewe to note representatives of the following types: a "Prince of Wales" 4-6-0, No. 8834, a rare "nineteen inch" (cylinders) 4-6-0 mixed traffic of Whale's design, which was practically a small wheeled version of the "Experiment" class; Webb 18 in. 0-6-0s, which are having 20,000 added to their numbers, so placing them on the condemned list; Webb 0-6-0 coal engines; L.N.W. 0-8-0s rebuilt and superheated; erstwhile suburban 0-6-2Ts with 5 ft. driving wheels, now classed "2P"; and "1P" 2-4-2Ts numbered 66xx and 67xx. U.S.A. war service 2-8-0s numbered 17xx and 20xx were being prepared for the road.

The Kettering-Cambridge branch line has been one of the happy hunting grounds recently of the few remaining Midland 2-4-0 veterans, but by a strange coincidence, owing to the failure of a Midland class 2 0-6-0, an L.N.E.R. former Great Eastern 2-4-0 recently worked the L.M.S. train of four bogies from Cambridge to Kettering!

Great Western Tidings

The "Hall" mixed traffic 4-6-0 class now includes 259 locomotives numbered 4900-99, 5900-99, 6900-58,

and it is understood that No. 6959 when built will inaugurate a new "modified Hall" class. Further 0-6-0 pannier tanks are Nos. 4650-9.

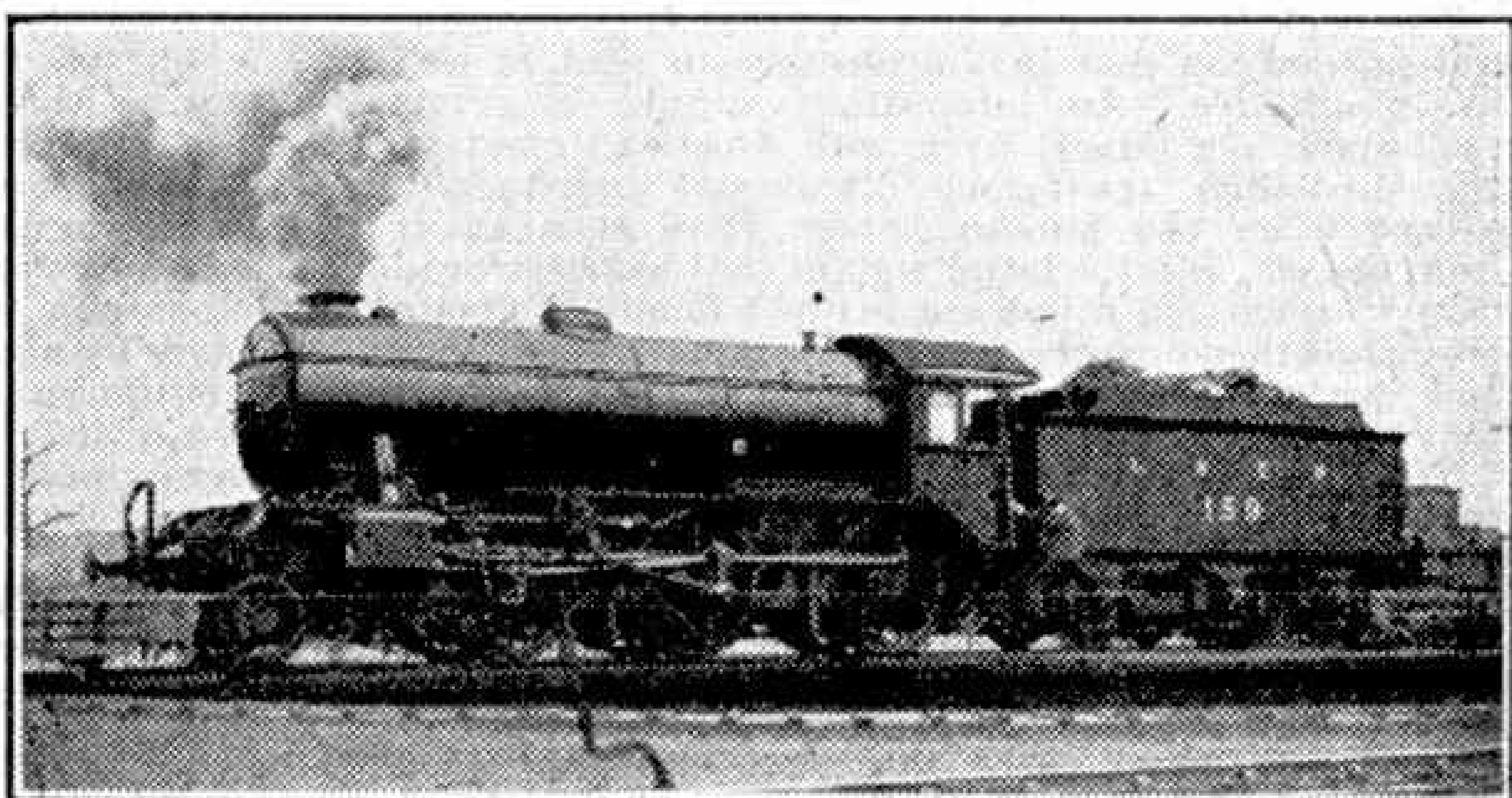
No. 6000 "King George V" is now running, probably temporarily during the continuance of hostilities, without the bell affixed on the front buffer beam. This was presented in 1927 by the Baltimore and Ohio R.R. on the occasion of this engine's visit to the United States in connection with the centenary of that pioneer American line. The semi-streamlined casing has been removed from 4-6-0 No. 5005 "Manorbier Castle," which now presents a normal appearance except for the wedge-shaped cab.

The passenger service over the Newbury-Winchester single line has been resumed, and is usually worked by a 2-6-0 or "Bulldog" 4-4-0. On special trains on

that route, continuing over S.R. metals to Southampton or elsewhere, the variety of G.W. locomotives has included 2-6-0, 2-8-0, 0-6-0 and "Duke" 4-4-0 types. In Central Wales, one of the light 4-6-0 mixed traffic engines of the "Manor" class has been seen on the former Cambrian route between Oswestry and Aberystwyth, into which town 2-6-0s of the first 43xx series also work from Carmarthen.

G.W.R. Paddington-Birkenhead expresses have been noted arriving in Birmingham with a "3200" 4-4-0, an "S100" 2-6-2T, or a "Hall" 4-6-0 assisting the "Castle" train engine with 14 or 15 coaches, presumably double-headed from Leamington on account of the 1 in 100 Hatton bank. A G.W.R. locomotive, often "Star" 4-6-0 No. 4062 "Malmesbury Abbey," with guard and travelling porter, makes the trip from Swindon to Leicester, L.N.E.R., via Banbury, and back each night. These travelling porters are a feature of G.W. operation. They sort parcels between stations, see to the handling of traffic at stations and also assist with closing doors, adjusting blinds, etc. during black-out hours. Many of them are now women.

The 10.45 a.m. service from Paddington to Gloucester



A large "K3" class 3-cyl. 2-6-0 mixed traffic locomotive of the L.N.E.R. on the turntable, with steam up.

and Cheltenham has been restored on weekdays, except Saturdays, when the departure is at 12.5 p.m. It is hauled by various types of 4-6-0 engine. It is interesting to recall that in normal times the London "Castle" and men that were to return with the "Cheltenham Flyer" worked down on the 10.45 to Gloucester daily, taking over the famous express there at 2.55 p.m. With double summer time in force, it is possible to see the 10.10 p.m. postal train from Paddington go down in daylight.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 6d., for postage.

"ONLY AN OCEAN BETWEEN"

By L. SECOR FLORENCE (Harrap. 6/- net)

This is a new sort of book, the first of a series that in pictures, writing and charts is to tell us things about Britain and the United States, and the people who live in the two countries. These are separated by 3,000 miles of stormy ocean. Every year this becomes less of an obstacle, however, and with the coming of air services it will soon be possible for all who wish to do so to pass from one country to the other in a few hours. In addition the war has made us allies, and we shall undoubtedly have to go on working together when peace comes. This means that we should know more of each other, and Miss Florence's excellent book will be a great help. An interesting feature of the book, and one that makes it particularly valuable, is that it is neither American nor British in point of view. In fact it is both, for the author comes from America, but has lived in Great Britain for many years while keeping touch with the States. It deals with the two lands, their climates, their agriculture and material resources, their roads and railways, and finally with the peoples themselves, and is splendidly illustrated. The pictures run in pairs, a scene in one country being placed alongside a corresponding view in the other, so that we can realise resemblances and differences at a glance. In addition there are several comparative charts which picture for us such items as the areas of the two countries, the occupations of their peoples, their coal and oil production, the growth of railways in them and even their weather.

The book is written in language that is picturesque and pointed, so that it is a pleasure to read as well as informative. An interesting example contrasts the Severn, our largest river, with America's greatest, the Mississippi, the former placid and undisturbed, except when the famous Severn Bore runs up it from the sea, and the latter a giant that has destroyed many a town and wiped out many a family. Climate provides other opportunities for striking comparisons and contrasts, as do farming, mining, and travel by road and rail.

The story is well rounded off by some account of the peoples who inhabit the two countries and of their ways. For the Briton there is an explanation of what are supposed to be the American's habits of exaggeration and boasting; for the American there is an estimate of the real meaning of the Briton's stiffness and reserve. The author's conclusion seems to be that after all there isn't much difference when the good and bad in both have been weighed up, and that in literal truth there is little else than an ocean between us.

"THE RED AIR FORCE"

By JOHN STROUD (Pilot Press. 5/- net)

When the Germans invaded the U.S.S.R. it was discovered that the Russians had an efficient air force, which put up a remarkable resistance to the enemy in spite of surprise and difficulties of all kinds. We began to hear of such machines as the "Stormovik," the "M.I.G.-3" and the "Y.A.K.-1," but details were lacking. This book supplies many of these

details for the first time.

Mr. Stroud begins his story with an account of the organisation of the Red Air Force. Then he tells us about pioneer flights during the last war, and the beginning of the modern Russian aircraft industry with the setting up of a Junkers factory near Moscow. He then traces the subsequent development of air transport lines and deals with outstanding flights in Arctic Russia and across Polar regions. This is followed by accounts of the latest developments of fighters and bombers, and of their achievements during the present war, after which come brief descriptions of each of the Russian-built machines with which the Red Air Force is equipped.

Other sections in the book deal with gliding and parachute development and the organisation of the Red Air Force. There is a large number of illustrations, most of them being made either from U.S.S.R. or British official photographs.

"PHOTOGRAPHY WITHOUT TEARS"

By MARCEL NATKIN, D.Sc. (Fountain Press. 3/6 net)

When a photographer has mastered the working of his camera he begins to look round for something to photograph, for he cannot become expert without practice. Mr. Natkin's book is intended to lead him to success in

selecting his subjects and in recording them in the best possible way. Any photographer who follows in his path should become capable and efficient.

Mr. Natkin works by example as well as instruction. His book is itself an attractive collection of photographs of all kinds, from landscapes to portraits, sports pictures and so on, and each has been carefully chosen to illustrate and drive home a special lesson. The effects of lighting and the best methods of arranging this are first dealt with, after which we come to the chief points to keep in mind in composing a picture. Various types of photograph are then dealt with in turn, and this section ends with valuable suggestions for more advanced work, such as the photography of clouds, rain and mist, and taking pictures by night, in artificial light or in other difficult circumstances. The best way of ensuring the correct exposure that alone will give a really good negative, is next considered, and finally there is a section on home developing and printing, and enlarging.

"LOCOMOTIVES OF THE CAMBRIAN AND BARRY RHYMNEY RAILWAYS"

"LOCOMOTIVES OF THE SMALLER WELSH RAILWAYS"

By M. C. V. ALLCHIN (1/6 net, each)

In these two booklets Mr. Allchin has given details of the locomotives of the railways concerned at the time immediately prior to amalgamation. The information given includes the running numbers, wheel types, building dates, and numbers allotted on grouping. In the second booklet, which includes the locomotives of the Midland and South Western Junction Railway in addition to the smaller Welsh railways, the works numbers of the engines also have been given.

Copies of the booklets can be obtained from the author at "Glenvale," Portchester Road, Fareham, Hants, price 1/7 post free.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

Engineering News

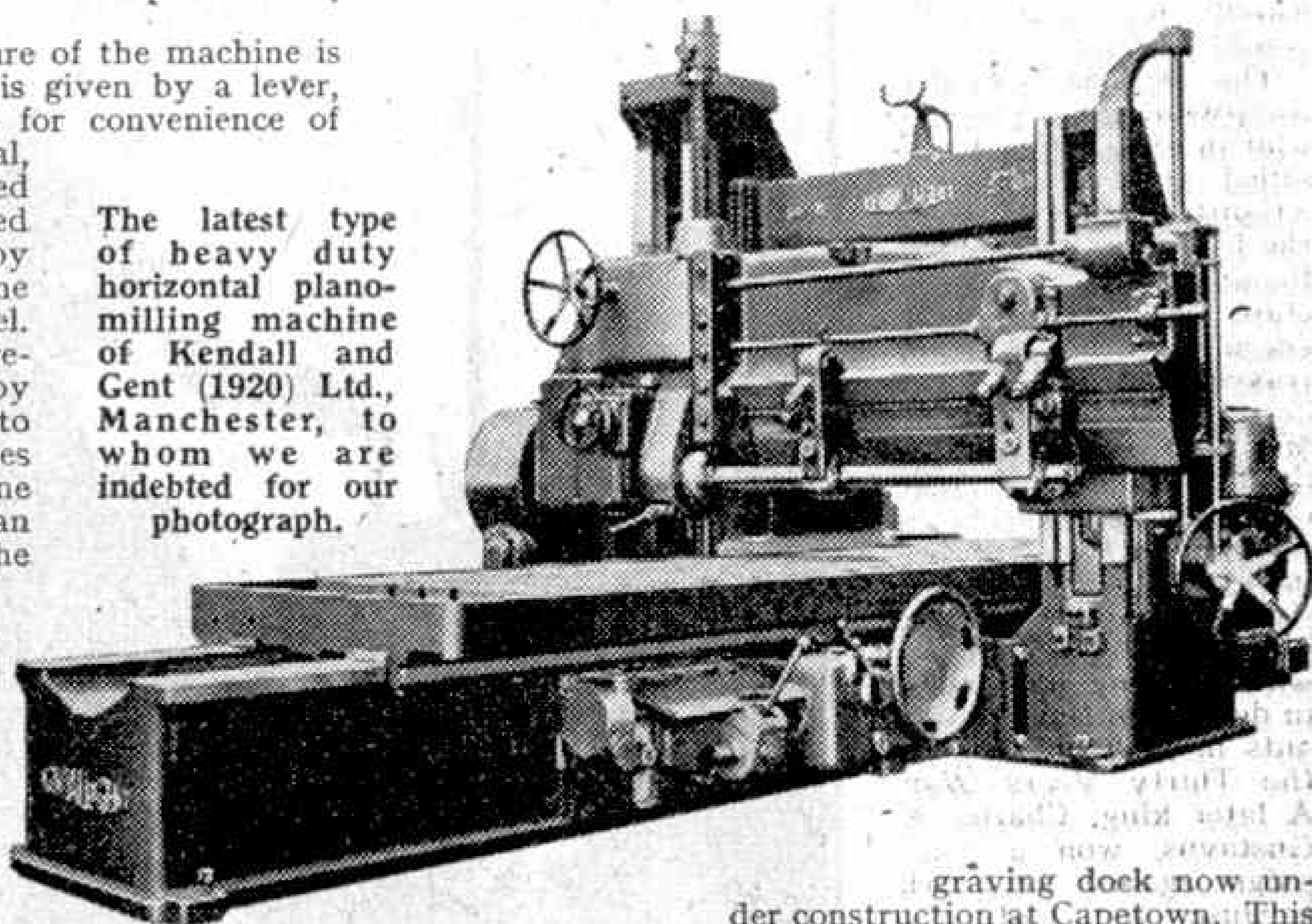
A Heavy Duty Plano-Milling Machine

The illustration on this page shows the latest heavy horizontal plano-milling machine introduced by Kendall and Gent (1920) Ltd., Manchester. This is designed on massive lines, and is capable of really heavy cuts to close limits of accuracy. The bed is of generous proportions, with flat slides that provide solid support to the moving table carrying the work. The table is of deep section, making it particularly rigid, and the massive cross slide shows no deflection whatever under the heaviest cut.

The cutters are driven by a 35 h.p. motor through a 9-change double lever operated box and a high efficiency worm and wheel reduction set. Milling cutters up to 12 in. in diameter can be used, and the speed range is from 12 to 53 r.p.m. A 5 h.p. reversing motor provides power for the table movement. It acts through a worm reduction set, and eight variable feeds, from $\frac{1}{8}$ in. to 6 in. per minute, are provided.

A particularly interesting feature of the machine is the control of the table, which is given by a lever, duplicated at the opposite side for convenience of operation. The lever is directional, that is the table can be operated as required, at any of the feed rates at which it can move, by merely moving the lever in the direction it is required to travel. The feed rates of course are pre-set. The table is stopped by simply bringing the lever back to the neutral position, and it comes to rest if the spindle of the machine stops for any reason, owing to an electrical interlock between the motors driving the table and the spindle.

The latest type of heavy duty horizontal plano-milling machine of Kendall and Gent (1920) Ltd., Manchester, to whom we are indebted for our photograph.



A Fireproof Ship's Life-boat

It is not a very long time since most merchant ship's life-boats were simply carried upside down on chocks, and they had to be fitted out hurriedly when the need arose. Nowadays they are equipped and ready for launching at a moment's notice, and the equipment itself has been the subject of much thought, as is shown by the provision of means for producing drinking water from the sea by distillation, as noted in "Engineering News" of the July "M.M." The latest development has been the introduction of a fireproof life-boat, a step that has become necessary in the conditions of modern warfare, when the crews of tankers may have to take to their boats with the surface of the sea covered with blazing oil or petrol.

A valuable feature of the new design is that it can readily be applied to the conversion of standard life-boats into fireproof vessels. This is done by fitting a sheath of thin metal and a hood of asbestos-cotton that completely covers the boat. Pipes also are fitted by means of which sea water can be sprayed over the outer surface, the water being supplied by hand pumps installed at the ends of the boat. The spraying prevents over-heating or ignition of the material of the boat, and has the further good effect of keeping down the temperature within its interior. As the fireproof life-boat is completely enclosed it cannot be propelled by oars. It is therefore fitted with a propeller operated by levers.

A wooden life-boat can be made fireproof in four or six days with complete efficiency. This has been shown in tests made in a concrete tank where

25 gals. of oil poured on the surface of the water were ignited. The oil burned so fiercely that spectators were driven back by the intense heat, but the boat under test in the tank proved to be unharmed when the fire was extinguished after burning for 4 min., a period normally sufficient to take a vessel out of the immediate danger area. In a subsequent test 10 officials remained in the boat throughout the period and emerged unhurt, and altogether the converted boat under test was exposed to the flames of burning oil for about 20 min., with temperatures that at times were above 1,300 deg. C., without suffering damage. An interesting feature was that the sprayed water running overboard tended to keep the burning oil away from the sides of the boat, and some of it was vaporised, thus providing a partial blanket of steam that served as additional protection.

Capetown's New Graving Dock

In previous issues we have given details of the

graving dock now under construction at Capetown. This will be 1,200 ft. long, 150 ft. wide and 45 ft. deep, and will be the third largest in the world. The rubble wall with which the site is enclosed has now risen some yards above the surface, and more than 500,000 cu. yds. of material have already been dredged out, although this work did not begin until May of this year. Now a cofferdam is being built around the site. This consists of interlocking steel sheets, and the first pile was driven in March last. More than 4,000 piles will be needed, and it will then take 10 days to pump the water out of the site, so that actual constructional work can begin.

When the task is complete Capetown will have a graving dock large enough to accommodate the greatest ships in the world. The dock indeed is being made of greater size than is really required at present for South African purposes, in order to make it available for Empire use, and in consequence the British Government will provide all the machinery and the gates, the cost of which will be about a third of the total.

The first of a new design of ocean-going naval patrol vessel, equipped for anti-submarine warfare, has been launched at Chicago. It is about 180 ft. long, and was built in 14 sections, which were conveyed to the launching ways four miles distant, and assembled. The vessel was launched sideways.

Life in Sweden

A Modern Country with a Long History

By M. A. Savonius

WHEN we mention Sweden, we are apt to think of it as a very modern country where everything is spick and span and new and very efficient. In a way this is true, because Sweden is well planned and organised, and there every modern invention may be found that makes men's lives easier and more pleasant. But at the same time we must not forget that Sweden has had a very long history. As far back as can be traced the country has always been inhabited by the same race of people, the Swedes, and it has never been conquered and overrun by enemy hordes. On the contrary, though the Swedes are now one of the most peace-loving peoples, far back in their history they were a warlike nation and Swedish fighters were known and feared far and wide across Europe.

The earliest Swedish conquerors were Vikings, who in their open boats sailed right across the Atlantic, penetrated all the big rivers in Europe, founded the Russian state and ruled it for seven centuries, and travelled right into the eastern parts of the Mediterranean. Later, Swedish soldiers fought on many battlefields in Europe, and one of her most famous kings, Gustavus Adolphus, was killed in action in 1632 while leading his troops in defence of the Protestants in Germany during the Thirty Years War. A later king, Charles X Gustavus, won a campaign against Denmark because he had the resource and audacity to take his army of 5,000 men, with all their guns and wagons, across the ice of the frozen straits between Sweden and Denmark, and so completely surprised the enemy that they gave up the fight in a short time. Charles XII, who became King of Sweden when he was only 18 years old, was probably the greatest warrior of them all, but his constant wars ruined Sweden, and when he was killed in Norway, his country, which had been rich and powerful, was sunk in poverty and all its European possessions were lost, never again to be re-conquered.

Since then, apart from a short campaign against Russia in 1809, Sweden has been at peace, and that is perhaps the main reason why the people have been able to develop their own country in such a magnificent way. Stockholm, the capital, is the most interesting town in Sweden, and the manner in which it has been built on a number of islands linked by bridges is unique in the world. Some parts of Stockholm are very old and the streets are so narrow that modern traffic is almost impossible. Other sections have splendid modern buildings, offices and blocks of flats, and one particularly interesting feature is a traffic junction known as Slussen, linking the northern and southern parts of the town. This is built on

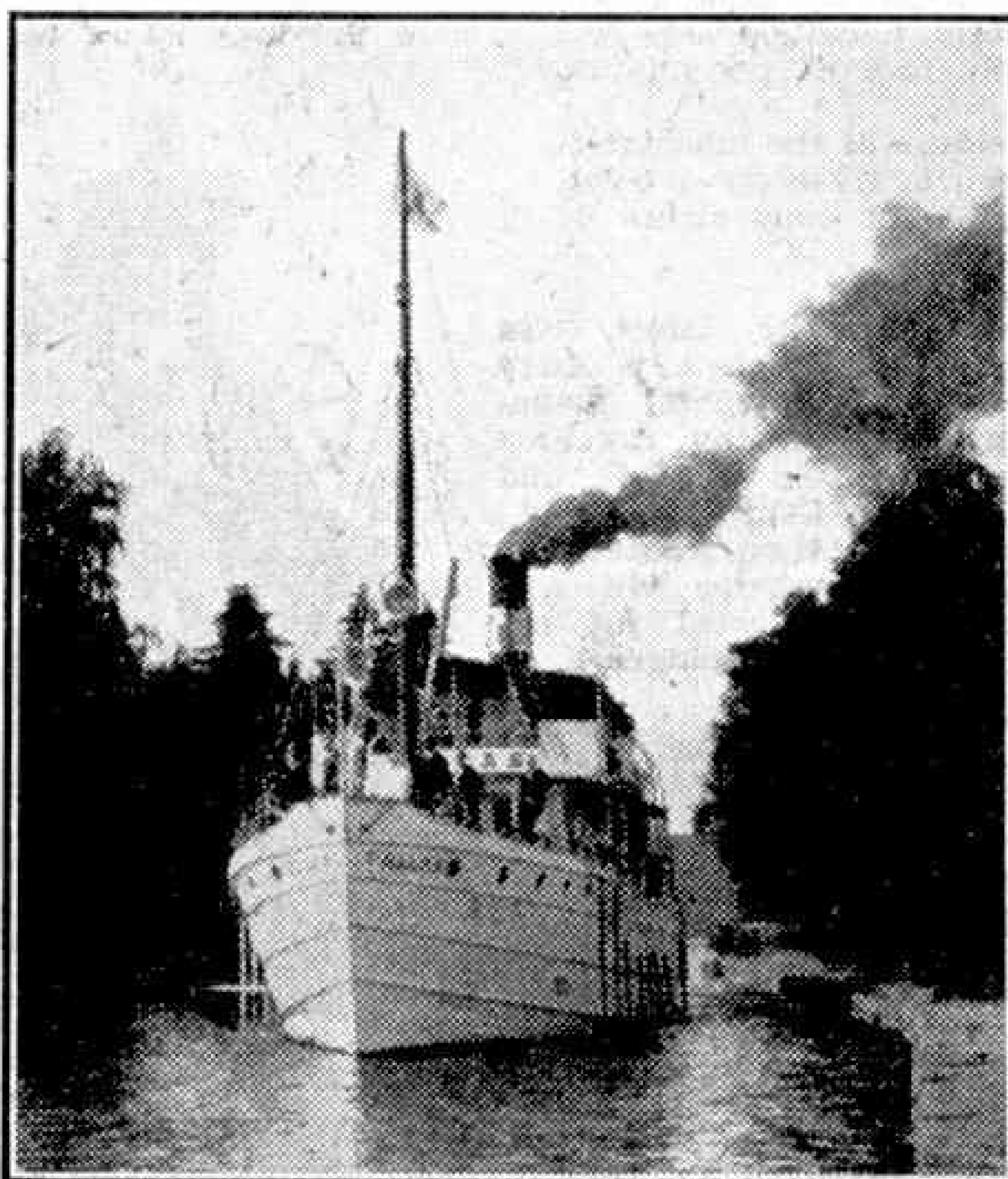
the "clover leaf" system, with two traffic routes intersecting at different levels, and loops joining the main routes in such a way that vehicles never need to cross each other's tracks. Slussen was the first traffic junction of this type to be built in the centre of a town; unlike some of the American road junctions of this kind, it has only three loops instead of four. Some 45,000 vehicles and 60,000 pedestrians cross it daily.

A famous Swedish traffic route of a different kind is the Göta canal, which links Gothenburg, on the south west coast, with Stockholm, on the east coast. It was first planned over 400 years ago. The work

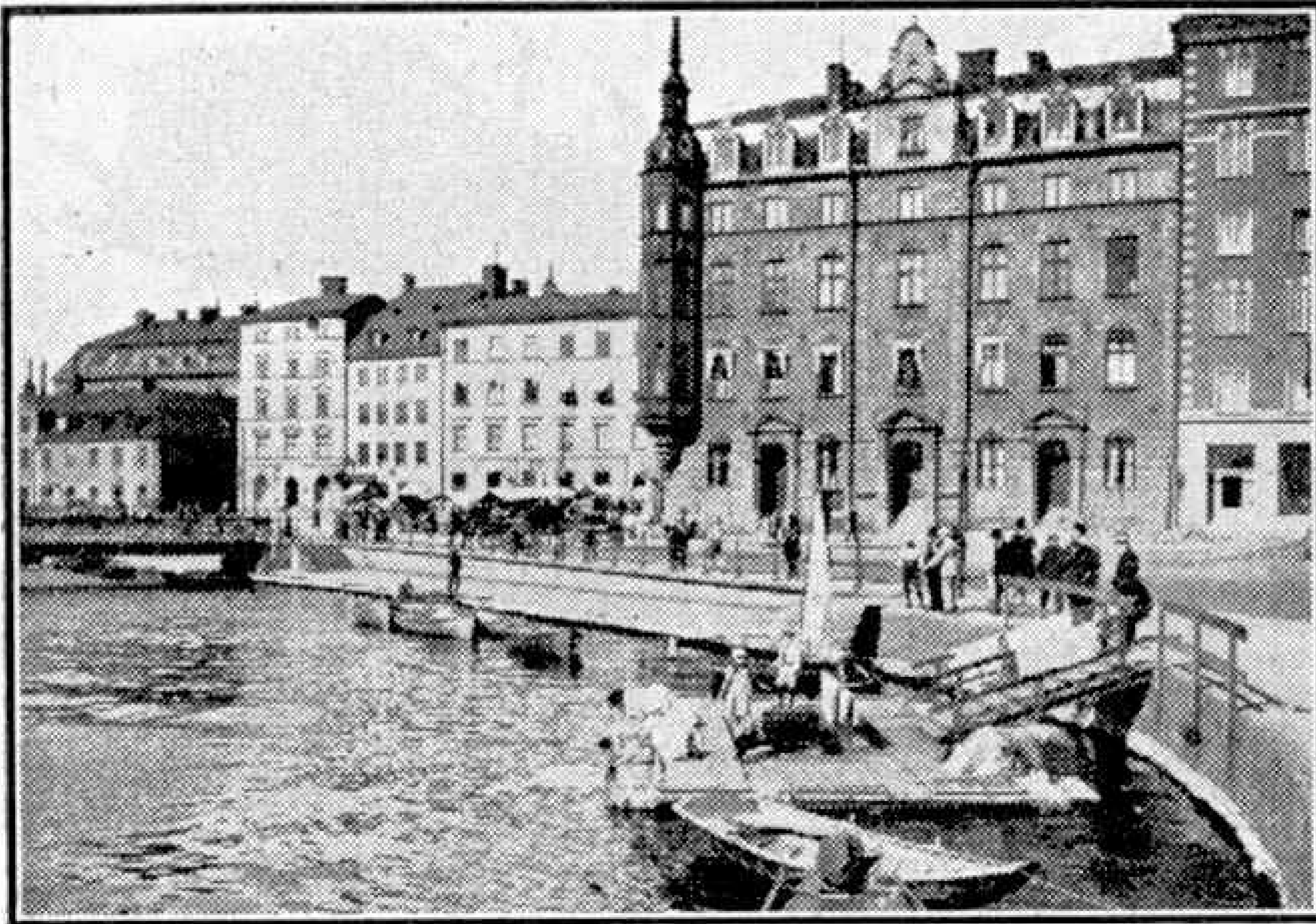
was very gradually completed, small sections being opened at a time, until finally the whole 240 miles were available to traffic. The canal passes through lakes and along rivers, but there are over 50 miles of artificial channels and in all 72 locks to overcome a difference in levels of as much as 300 ft. A special fleet of small steamers handles the passenger and goods traffic along the canal. The steamers have to be small, as no vessel longer than 100 ft. or wider than 21 ft. can pass through the narrowest reaches of the canal, but in every detail they are perfect little luxury vessels, more like elegant private yachts than "canal boats."

The Swedish inventor John Ericsson was one of the men who worked on this canal, not only in the planning of it, but actually in the manual labour. He was only 14 when he was put in charge of 400

canal workmen, and was so small that he had to stand on a chair to use the levelling instruments. This was the same man who later went to America, where he designed the famous pioneer turreted ironclad "*Monitor*," and developed the screw propeller. There have been many other notable Swedish inventors, whose names are now famous. Among them were Celsius, who originated the Centigrade temperature scale, and Gustav de Laval, the inventor of the impulse steam turbine. The most accurate precision gauges were designed by a Swede, Johannsen. Oxygen was discovered independently of Priestley by Scheele, a Swedish chemist, and Berzelius, another Swede, was one of the greatest figures in the history of chemistry and originated the system of writing chemical formulæ. Arrhenius, also a Swede, laid the basis of modern electro-chemistry. Ball bearings, Aga lights and Aga cookers, the turbine principle applied to railway engines, the submarine mine and dynamite are other Swedish inventions. Dynamite was discovered by Alfred Nobel, who later founded the Nobel Prizes, which are given annually to those men or women who have made the greatest discoveries



Passing through the Göta Canal. This is 240 miles long and crosses Sweden from Stockholm to Gothenburg.



A scene in Stockholm, with washerwomen at work in one of the many streams that intersect the city.

in physics, chemistry and medicine, written the finest pieces of literature, and worked most for peace among the nations.

Sweden's most important exports are iron ore and timber. The highest grade ore is mined at Kiruna, which lies just within the Arctic Circle. A huge mountain, composed almost entirely of the richest iron ore in the world, rises above the town, and the ore is obtained by simply levelling off the top! All transport, light and heating in this mining town is by electricity, obtained from water power. Lighting is particularly important, as during the Arctic winter there are only a few hours of daylight each day, and production would be seriously curtailed unless the mines were illuminated cheaply and efficiently.

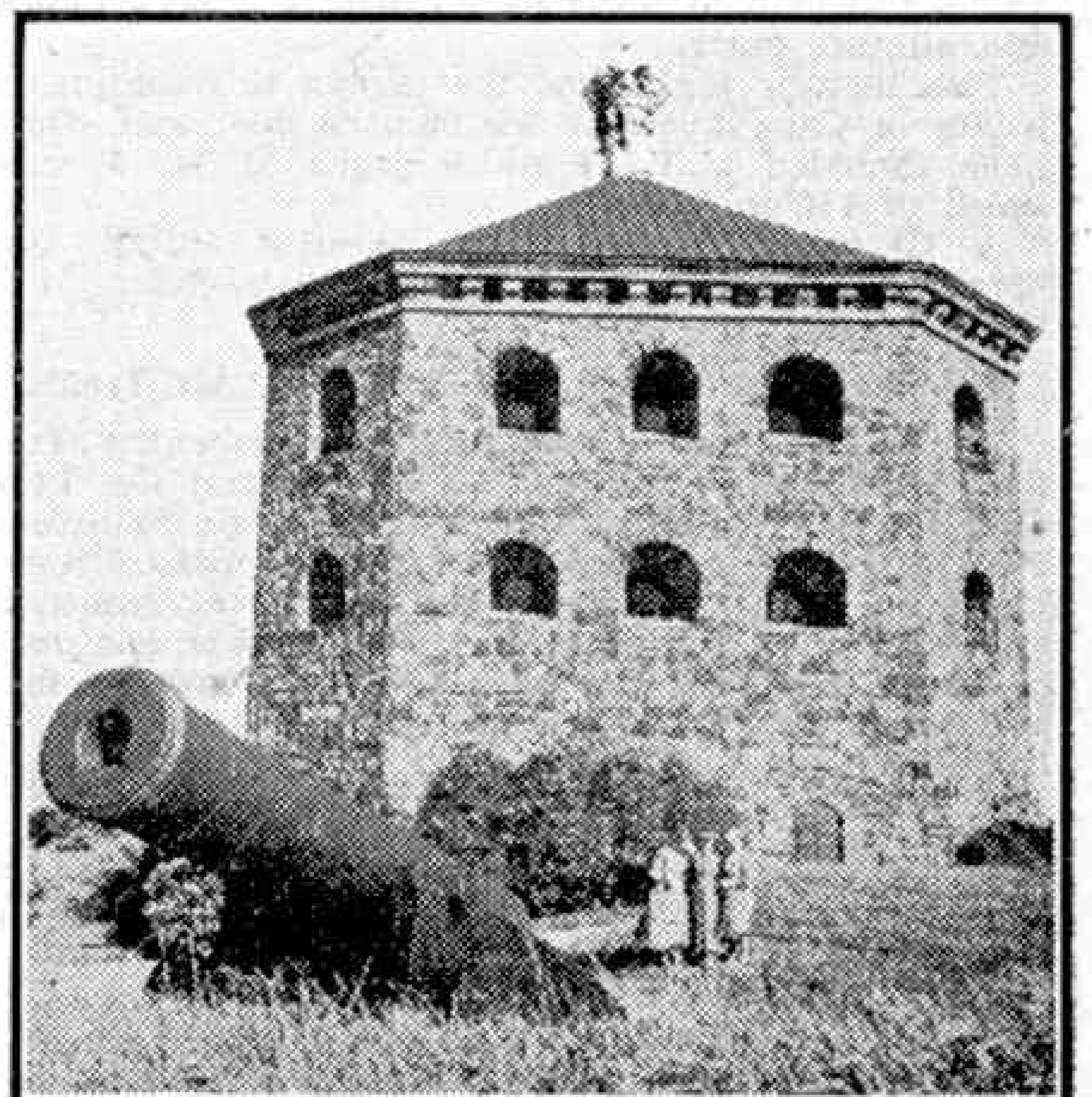
Sweden is an ideal country for the growth of timber. The soil and the rainfall are just right, and natural forests of pine, spruce and birch cover about half the territory of the entire country. In the winter, heavy snow in the timber regions makes the work of logging possible, but when spring comes the rivers are freed from ice, and the cut timber is transported rapidly to the various ports on the Gulf of Bothnia. Forestry is taken very seriously, because the people realise that the whole prosperity of the country depends on her timber, and every year great numbers of young men enter the forestry schools for training. All tree felling is strictly controlled, and no immature timber may be cut, except for thinning purposes, while replanting must take place within a stated time, so that no land is wasted. Very large tracts of timberland are owned by the Swedish Match Company, with its headquarters in the town of Jönköping, at the southern end of Lake Vättern. The first small factory was established there about 100 years ago by the two brothers Lundström, and since that day the industry has grown to such an extent that Sweden has become the greatest match-producing country in the world.

Although Sweden to-day is a modern country in the best sense of the word, with well-planned, clean towns and a prosperous industry, the countryside itself is quite unspoilt, and in many districts life still goes on in the old traditional manner. The province of Dalecarlia, which lies about half way up the length of Sweden, is the most noted centre of old peasant culture. The picturesque groups of farm buildings, made from thick logs with roofs of wooden shingles, cluster together under the birch trees by lakes and rivers, and the people still wear bright native costumes on all festive occasions.

Outdoor sports of all kinds have always been popular in Sweden, and the modern system of gymnastics originated there. During the winter young people of all classes ski and skate, and during Christmas holidays and week-ends all the trains and buses running out from the towns are packed with jolly crowds of youngsters equipped with skis, and carrying their day's food in rucksacks on their backs. The summer in Sweden is warm and sunny, and people practically live out of doors. All along the coast, among the myriads of little islands, sailing boats and small motor boats swarm about, and you see white tents pitched on the shores and people swimming and sun bathing on the rocks. Hiking too is very popular, and although so many people go out trekking the country is so large, and so sparsely populated as compared with England, that there is never any over-

crowding in one place, and you can often wander about for days in the lonely northern parts without meeting anybody at all. As in Denmark, almost everybody rides a bicycle, old as well as young, and Swedish bicycles are extremely good ones. Unlike the bicycles in England, they seldom have a hand brake, but are fitted with a hub brake on the back wheel, which comes into action on pedalling backward.

Up to date Sweden is one of the few countries that have been able to keep neutral in this war, and she may be fortunate enough to escape war damage altogether. Naturally her trade is suffering, and food is rationed as in most other countries, but when peace does come again Sweden will be in a position to recover very quickly. When tourists once more begin to travel the world, Sweden, being unspoilt, thoroughly civilised, and in every way a delightful country to visit, is certain to capture a high percentage of the tourist trade.



"The Crown," a Swedish fort built in 1660. It is now a military museum.



Loading a "Stirling" heavy bomber in readiness for a raid upon enemy objectives.

Air News

First Transatlantic Glider Flight

The first flight across the Atlantic by a towed glider was announced by the Air Ministry on 5th July last, when details were given of the successful transatlantic flight from Montreal to an airport in Great Britain of an American Waco CG-4A glider towed by a Douglas C-47 "Dakota" of R.A.F. Air Transport Command. The total distance flown was 3,500 miles, and the trip, accomplished in stages, took 28 hours' flying time.

The "Dakota" used was modified for the ocean flight, and had special extra fuel tanks which could be jettisoned intact in an emergency. It towed the glider by a special rope, the metal towing attachments of which were stressed to withstand a pull of 20,000 lb. The Waco glider is of 84 ft. wing span. It is designed to carry 1½ tons of freight, and on this ocean flight it had a full load of vaccines for Russia, radio, motor, and aircraft parts.

This historic flight was the climax to experiments begun in Canada about six months ago, and which have included a 1,177 miles flight at an average speed of 150 m.p.h.

A German News Agency recently stated that "Halifax" bombers are towing British gliders over the Atlantic.

Big Transports for British Post-War Air Traffic

The Ministry of Aircraft Production recently asked five British aircraft firms, A. V. Roe and Co. Ltd., Short Bros. (Rochester and Bedford) Ltd., Saunders-Roe Ltd., Handley Page Ltd., and the Bristol Aeroplane Co. Ltd., to prepare designs for big transport aircraft for post-war use. Sir A. Verdon Roe, chairman of Saunders-Roe Ltd., has indicated that his firm and Short Brothers are to co-operate in designing a flying boat large enough to carry up to 200 passengers and about 23 tons of petrol, and with a range of about 4,000 miles.

The de Havilland Aircraft Co. Ltd. also have been asked to produce a large civil transport aircraft.

U.S. Bomber Crews Wear Armour

A modern counterpart of the suit of armour worn by a knight of old when he rode to battle is the armoured vest and apron now worn by each member of a U.S. bomber crew, as protection from "flak" splinters and explosive shell fragments. There are two types of

vest and apron, one full width and weighing 22½ lb. for aircrew members who have to stand when on duty, and a tapering version a few pounds lighter for other members. The pilots wear half-vests that give only front protection, as these men are protected at their back by the armoured seats they occupy. The armour worn is made of overlapping small squares of manganese steel sewn into cotton fabric. The apron hooks on to the vest and protects the wearer as far down as the knees.

This protective clothing was the idea of Col. M. C. Grow, a surgeon of the U.S. Army Eighth Air Force.

Glider Training in Enemy Countries

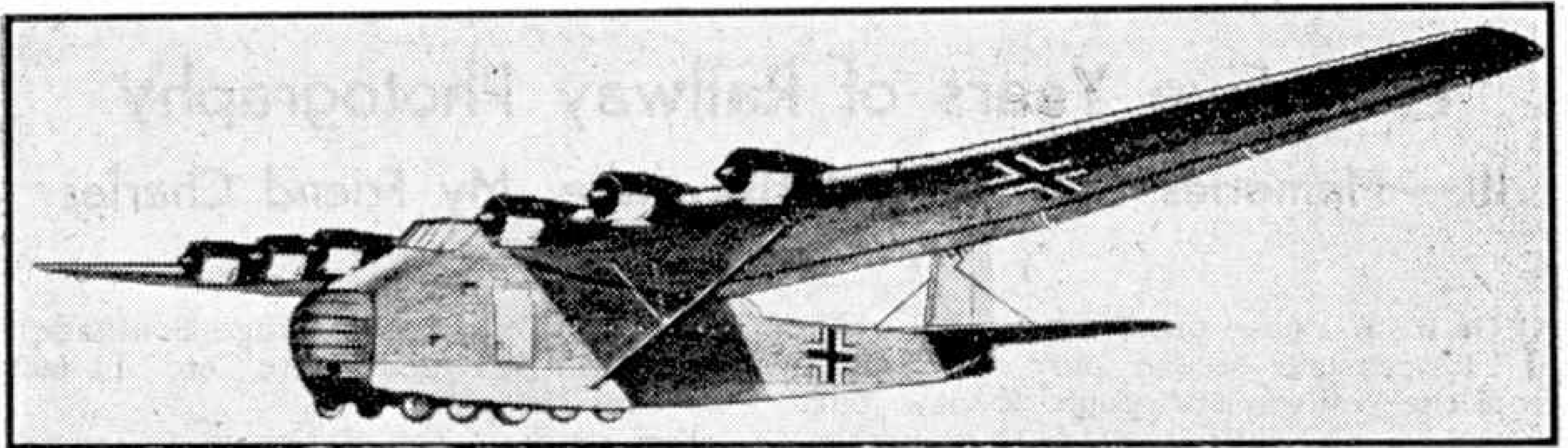
News comes from Japan of considerable development in glider training in that country, and the number of schools there giving instruction in this form of flying has increased from 602 at the outbreak of war to 1,151. The number of gliders owned by the schools also has increased, from 700 to 1,444. Glider and sailplane construction has been made compulsory at some technical schools.

In Rumania the Under-Secretary for Air has announced that boys of 16 to 24 years of age can enrol at glider schools for free training, and that the Government will pay the board and lodgings of accepted youths.

Air/Sea Rescue Service Using Airborne Life-boat

The Air/Sea Rescue Service are using an airborne life-boat designed specially for dropping by parachute. It is carried under the fuselage of the aircraft, from which it is dropped to the men adrift on the sea, and it automatically rights itself when it lands on the water. Buoyancy tanks in the boat prevent it from capsizing even in a very rough sea. It has two engines, a good supply of petrol, and carries a stock of food and change of clothing for the rescued men. There is also a portable radio set, supply of pyrotechnics, and oars and sail for use in case of engine failure.

The 4-engined "Clipper" flying boats of Pan American Airways have flown more than 44,000 passengers across the Atlantic since the company introduced their transatlantic air mail and passenger service in May 1939. A total of 1,400 crossings have been made, and the mileage flown amounts to nearly 7,000,000.



Messerschmitt Me 323 six-engined transport monoplane, which can carry about 100 troops.

Messerschmitt Me 323 Transport

The top illustration on this page shows Germany's latest transport monoplane, the six-engined Messerschmitt Me 323 developed from the Me 321 glider. Several of these big aircraft were shot down during the North African campaign. Normally the Me 323 has a crew of five, consisting of two pilots whose cockpit is forward of the wing leading edge and has armour plating protection, a radio operator who occupies a port side cabin built inside the main spar of the wing, and two engineers stationed in cabins in the wing leading edge, one on each side of the fuselage, from which they control the three port and three starboard engines respectively.

The fuselage nose has two doors 11 ft. high, which when opened give entry to the main loading compartment, 20 ft. long and 9 ft. wide. Doors in the sides of that part of the fuselage behind the wing give access to a second loading compartment only 1 ft. shorter than the front one. According to German reports, a 3-ton lorry, a light tank, or 100 troops can be carried in the machine, and up to 18 7.9 mm. machine guns can be mounted for defence.

The Me 323 has a wing span of 181 ft. and is 93 ft. 4 in. long. The six Gnome-Rhône engines develop a total of 5,790 h.p., and give the machine a top speed of about 170 m.p.h. A conspicuous feature is the 10-wheel undercarriage to facilitate landing on rough ground.

New Boeing Research Centre

A new high-speed wind tunnel and aeronautical research laboratory is nearing completion at the Seattle, U.S.A., plant of the Boeing Aircraft Company. It will provide greatly improved facilities for carrying on the work of the late Edmund T. Allen, who was

the company's Director of Flight and Aerodynamics, and who, with 10 associates, was killed in a bomber accident last February. The wind tunnel and laboratory facilities were planned and developed under his supervision, and the new research centre will be named the Edmund T. Allen Laboratories.

Great New U.S. Airport

Another "World's largest" airport is under construction at New York, this time at Idlewild, on the northern shore of Jamaica Bay, N.Y. It is expected to be completed next year, and will be 2,576 acres in extent, about five times larger than La Guardia Field. It is designed for use by both landplanes and flying boats. There will be eight 200 ft. wide runways, totalling 13 miles in length, and they will be laid down in pairs, each pair in a different wind direction.

Trans-Canada Airlines Extension

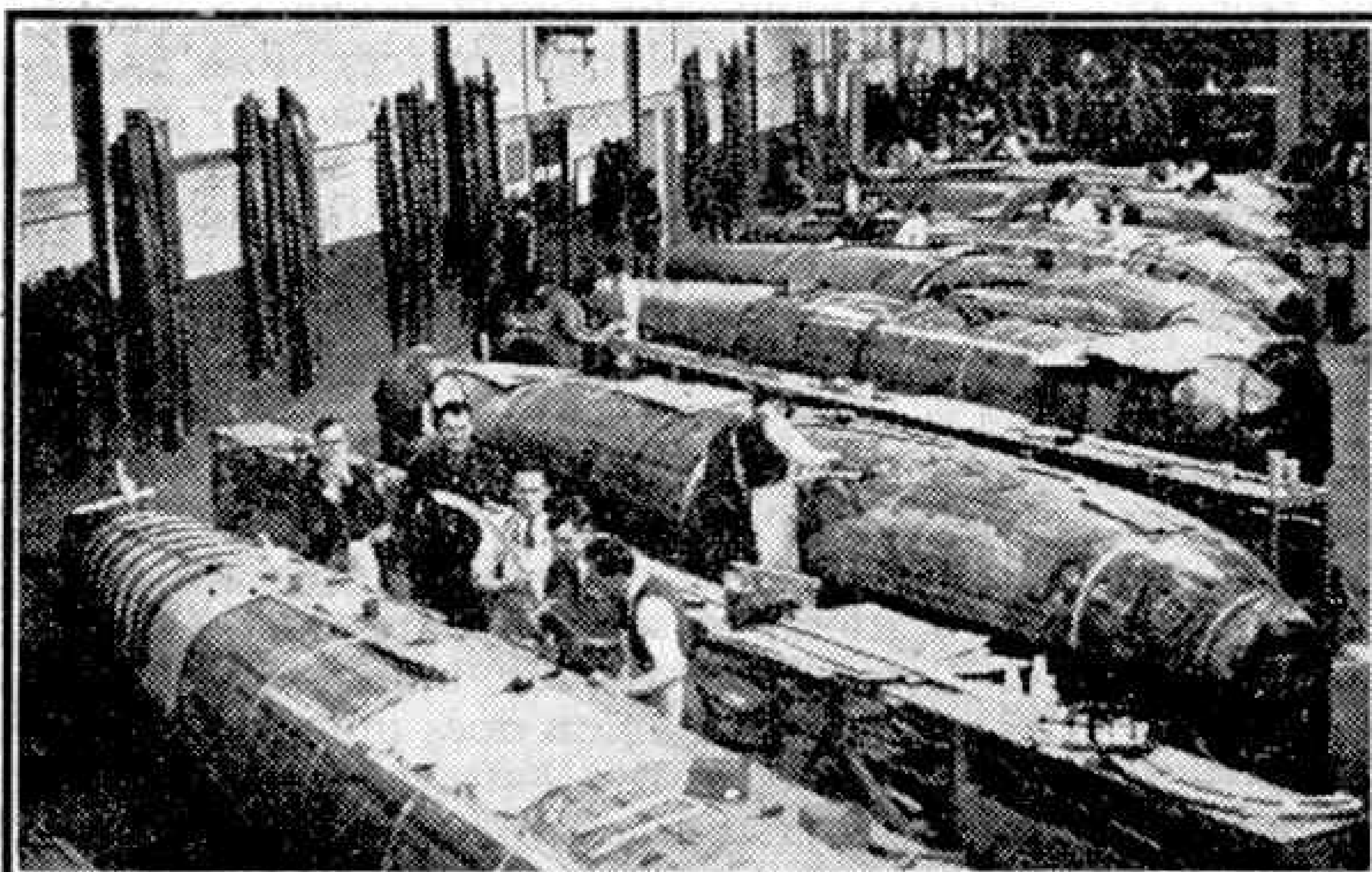
Trans-Canada Airlines have extended their St. Johns, Newfoundland—Vancouver air service to Victoria, on Vancouver Island. This great air line now totals 3,911 miles, and is the longest on the American continent. The service is operated twice daily, and the westbound machines reach Vancouver at 10.40 a.m. and 10.40 p.m. respectively; the extension to Victoria takes a further 25 min. flying time. On the eastward trips the machines leave Victoria at 4.15 p.m. and at 1.30 in the morning.

In April this year the company carried a total of 11,537 passengers, which was 2,722 more than in April 1942. Increases in air mail and freight were even more striking, the 292,401 lb. of mail flown being just over double the quantity dealt with in the corresponding month in 1942, and the 61,577 lb. of freight flown in April last was almost four times greater than the figure of a year previously.

Giant Plywood Flying Boat

Some details of the all-plywood giant flying boat under construction in the United States by the Henry Kaiser-Howard Hughes interests are given in a report on air transport issued by the U.S. Office of War Information. The aircraft will have eight engines, an estimated cruising speed of 174 m.p.h., and will be able to carry about 120,000 lb. of cargo. It will be of 320 ft. wing span and 218 ft. long.

The quantity of aircraft being produced in the United States is now greater than the output of all Axis countries together, and production of 4-engined bombers is six months ahead of schedule. The main types now being turned out by the American aircraft factories are 4-engined and twin-engined bombers, transports, and long-range fighters. In Great Britain the output of aircraft now exceeds that of Germany for the Luftwaffe.



D.H. "Mosquito" fuselages under construction. (See special article on page 260). Photograph by courtesy of The de Havilland Aircraft Co. Ltd.

Forty-Five Years of Railway Photography

III.—Memories of York and Elsewhere: My Friend Charles

By H. Gordon Tidey

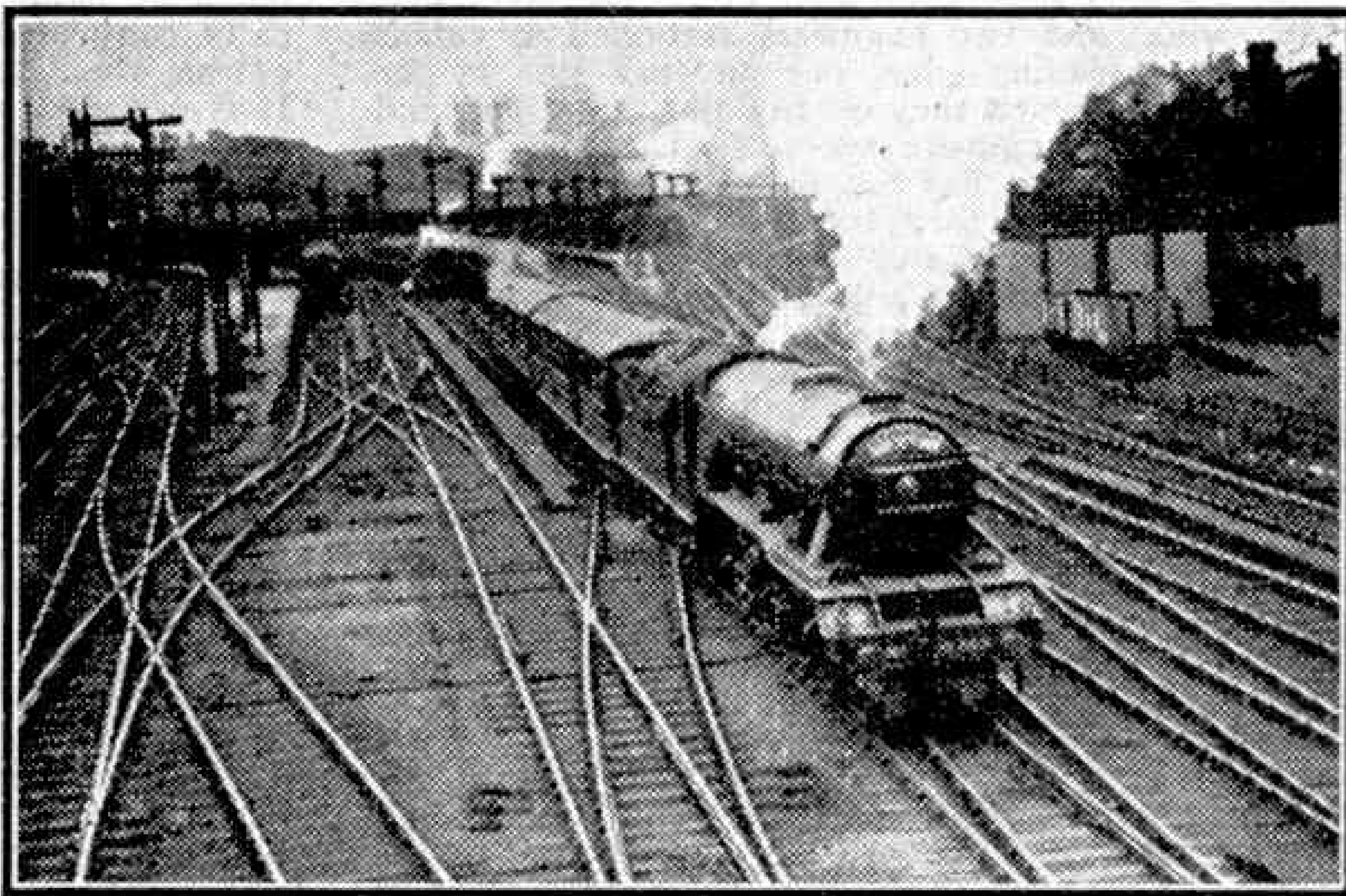
YORK, as I have previously said, I used to consider second only to Carlisle from the "railwayists" point of view, but nowadays, and entirely owing to grouping, quite a lot of locomotive variety has been abolished. The principal Scottish and Newcastle trains are now worked through by L.N.E.R. "Pacifics," whilst trains, previously worked by Lancashire and Yorkshire and Midland engines of varying classes, are now nearly all headed by those capable and efficient Stanier mixed traffic 4-6-0s, which are to be seen on every class of work, from hauling crack expresses to shunting, all over England, Scotland and Wales, almost the only exceptions being the domains of the late Great Eastern railway and the Great Western in Cornwall and Devon! One still sees a good number of late N.E. engines, but they are mostly relegated to secondary services, whereas before the grouping, all G.N. engines came off at York, and were replaced by the N.E., usually the 3-cylinder "Atlantics" of Class Z., which used to deal with the heavy Scots expresses in a capable manner.

Of the interesting trains one sees at this station the one that always intrigues me most is that enterprising production of the G.C. Section which sets out from Newcastle, apparently with the ambitious intention of visiting most places of importance in England and not a few in Wales! Whether it takes in any parts of Scotland, or hops across the Irish Channel, I have not ascertained; but I have met odd bits of it wandering about all over England and Wales. It can be seen in its entirety leaving York, and despite its not inconsiderable weight I have never seen it hauled by an engine larger than a "Director," or very often a smaller 4-4-0. The array of destinations served by this Newcastle-Cardiff and Swansea train and by other similar "omnibus" services presents no small puzzle as to routes

followed to Oxford, Cambridge, Southampton, Cardiff, Plymouth, etc., etc., in fact "all over the place"!

Just south of the station is an outsize signal gantry, and it was from this vantage spot that I obtained the accompanying photograph. This gantry would be an ideal spot for the use of a camera fitted with a front lens shutter, although a permit would be necessary to get there.

In recent years I have been doing these tours by car instead of train, which is not



L.N.E., G.N. Section. Up "Scarborough Flier" leaving York.

only a great relief as regards carrying of luggage, but also enables one to quickly transfer from place to place, often finding points remote from main road or station which would involve a lot of walking to reach. It will also be seen that there is no necessity to waste time in dismantling the camera, which can be carried at the "ready." It certainly would have been a boon with those heavy cameras in the old days, but of course was then quite beyond my pocket.

Of later years I have been accompanied by a friend of similar tastes, one Charles, and it will be readily understood that a congenial companion does much to enliven things during the enforced waits which occur even on busy main lines. The water troughs at Tebay were a favourite hunting ground of mine. These are situated at the foot of Shap, amidst glorious



Lancashire and Yorkshire Railway. Up Blackpool Excursion near Farington.

Westmorland scenery, and very pictorial effects can be obtained there, although the trains are travelling fast in both directions. There is a stream which runs along beside the track here, and whilst searching for a sky filter we had dropped, Charles enlivened the proceedings by not only falling in himself, but dragging me in with him, luckily into only about a foot or so of mud and water.

There is quite a lot of interest to be seen at the station here. The line, after leaving Oxenholme, starts straight up Grayrigg bank, at the top of which are a few miles of level (on which are situated the troughs) before reaching the station, immediately to the north of which the trains have to tackle the formidable Shap, extending for nearly six miles to the summit. Accordingly all trains of any weight that are not double-headed stop for a "pusher," which is waiting in the adjoining yard: and it is an impressive sight to see them start away up the bank, with both engines being heavily coaled and emitting volumes of black smoke. I have seen many types of engines used

as pushers. For a long time there were a number of the large L.N.W.R. 4-6-2 tanks stationed at Tebay for the purpose, but recently the work has been done mostly by the L.M.S. standard 0-6-0 tanks.

Another very interesting station is Preston, where one used to see all types of L. and Y. locomotives, in addition to L.N.W.R.; and on a Saturday in the summer Blackpool excursions followed each other in an endless procession, worked indiscriminately by all types—2-4-2 tanks, 4-4-0s, 0-6-0 goods, 4-4-2 "Atlantics" (the 1400s), and of course, later, the 4-6-0s of Hughes' design. By the way, these last in their final form were used of later years largely for L.M.S. main line trains between Crewe and Carlisle, until the advent of sufficient more powerful engines, and they were often piloted by a L.N.W.R. type engine.

It will be seen from these remarks that during such a long period of years it has been possible to obtain an infinite variety of records of locomotive workings at the same spots—a variety which, alas, will not recur, owing to the standardisation of locomotive design now in full swing.

It was at Preston that Charles caused much amusement to the hotel "Boots" by forgetting to pack his spare pair of trousers and electing to carry them all day as a separate item of luggage. One assumes he carries spare trousers in case he falls into streams.

When proceeding on these tours we used to start away from London about mid-day, and when heading for the north

(Continued on page 286)



L.M.S. Up Glasgow-Manchester Express passing Tebay troughs at 75 m.p.h.



Seagulls at Land's End. Photograph by S. S. Pethybridge, Newton Abbot.

MANY of you will be taking your holidays during this month and next, and some will doubtless be at the seaside or near the coast so that you will want to know the best way to secure some good sea pictures.

Waves breaking over the rocks or rushing over the sands are responsible for thousands of exposures every summer. You must bear in mind that there is always more movement in rough seas than you imagine, therefore fast exposures are necessary. You should also only attempt such scenes when the sun is shining or there are only small clouds about; a dull day means poor results.

If you intend to try your hand at waves breaking over the rocks or at the cliff base, select a suitable spot near where the wave will break. Do not hurry, but look in your view-finder till you are sure you have the scene well composed for a picture. Hold your camera in that position, then



Cromer fisher boy. Photograph by John J. Curtis.

Photography at the Seaside

By A.R.P.S.

keep your eye ready for the wave, and click at the right moment. For taking the perfect roller coming into the beach, select a spot where you can look

along the wave and not where your camera will be face-on to it.



In full sail. Photograph by C. N. Rees, Oldham.

If you are staying at a place where there is a lot of shipping or a harbour, you should on your arrival call at the police station, taking your camera and your identity card, and ask the officer if you are permitted to take photographs in the neighbourhood; this is the only safeguard, and it is important.

The beach is one of the worst places for a camera. The grains of sand will find their way into the interior and also into the shutter, so never leave it lying about and always have it packed in its case when not in use.

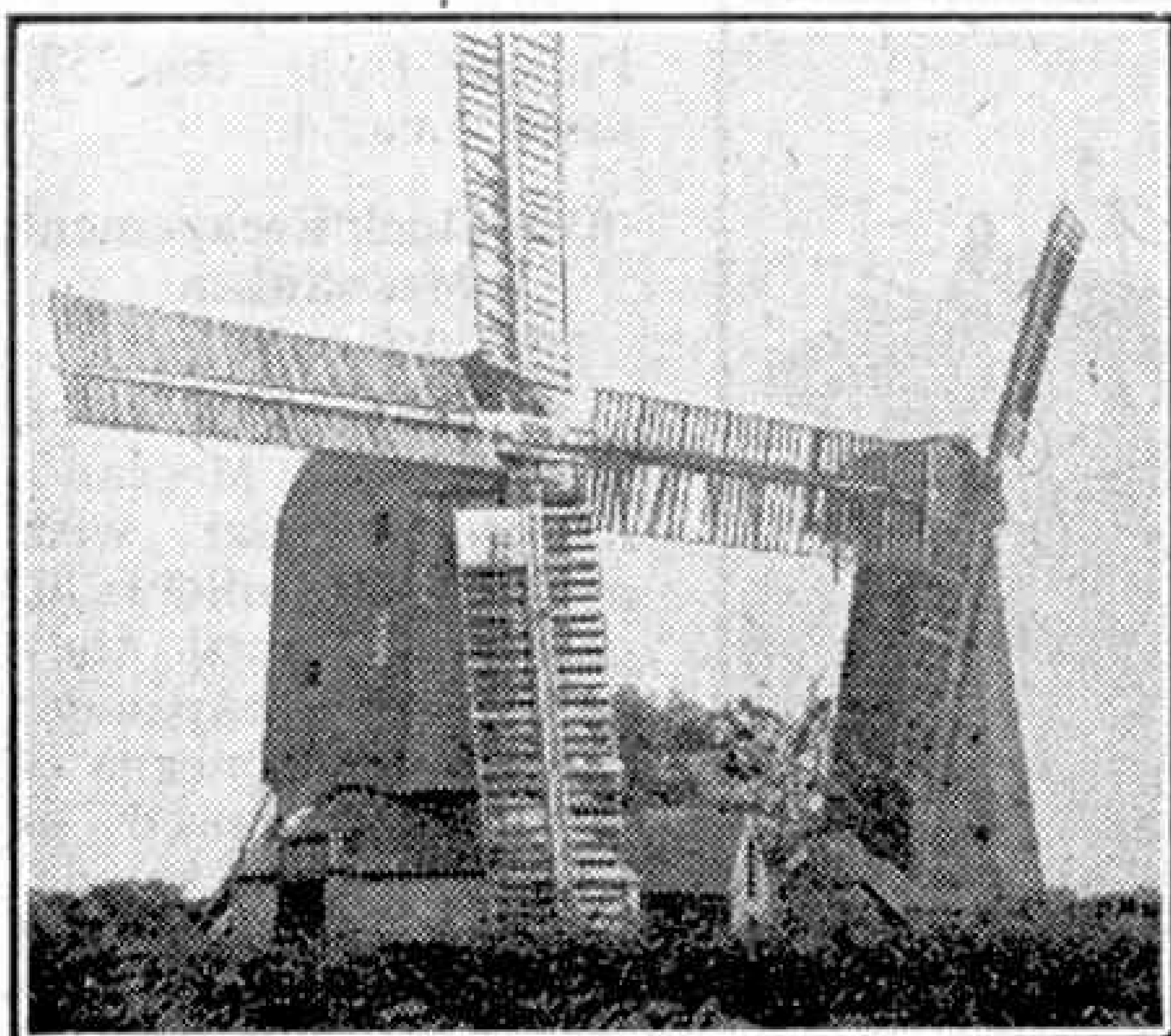
After taking your wave scenes rub the front of the camera, and especially the lens and metal parts, with a soft dry cloth or silk handkerchief to remove any dampness caused by spray.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

AN ANCIENT SURREY WINDMILL

About five miles south-east of Reigate is the tiny village of Outwood, on a common in the depths of the Weald. There two ancient windmills stand side by side, near a few scattered cottages. One of them



The left-hand windmill of the two shown in our illustration was built in 1665 and is still in working order. It is at Outwood, Surrey. Photograph by P. Milne, Whyteleaf, Surrey.

is a postmill, with its body erected on a roundhouse and with steps leading up to it. It is black tarred, with white sails, as can be seen from the accompanying photograph, and it was built in 1665 by an ancestor of the present owner. It had lost two of its sails, but these have been replaced by The Society for the Protection of Ancient Buildings.

The mill is still in working order, and corn is ground in it when there is enough wind. It has three storeys, with a massive oak centre post and huge wooden cog wheels. The entire upper part is turned on its axis to bring the sails into the wind, and one man can easily move it round.

Until a few years ago the Outwood post mill was thought to be the oldest remaining in England. It first worked in 1666, the year of the great fire of London, and it is said that the people of Outwood watched this from the top of the mill, 22 miles from the city. It is now known that a post mill at Bourn, about 12 miles from Cambridge, is older than that at Outwood. This is mentioned in a deed of 1643.

The second Outwood mill, a tall gaunt-looking building, is rapidly falling to pieces, and looks as though it may collapse at any moment. It is very ghastly by this mill at night, with the sails creaking and the loose boards banging about in the breeze.

P. MILNE (Whyteleaf, Surrey).

A VISIT TO THE RHONE VALLEY

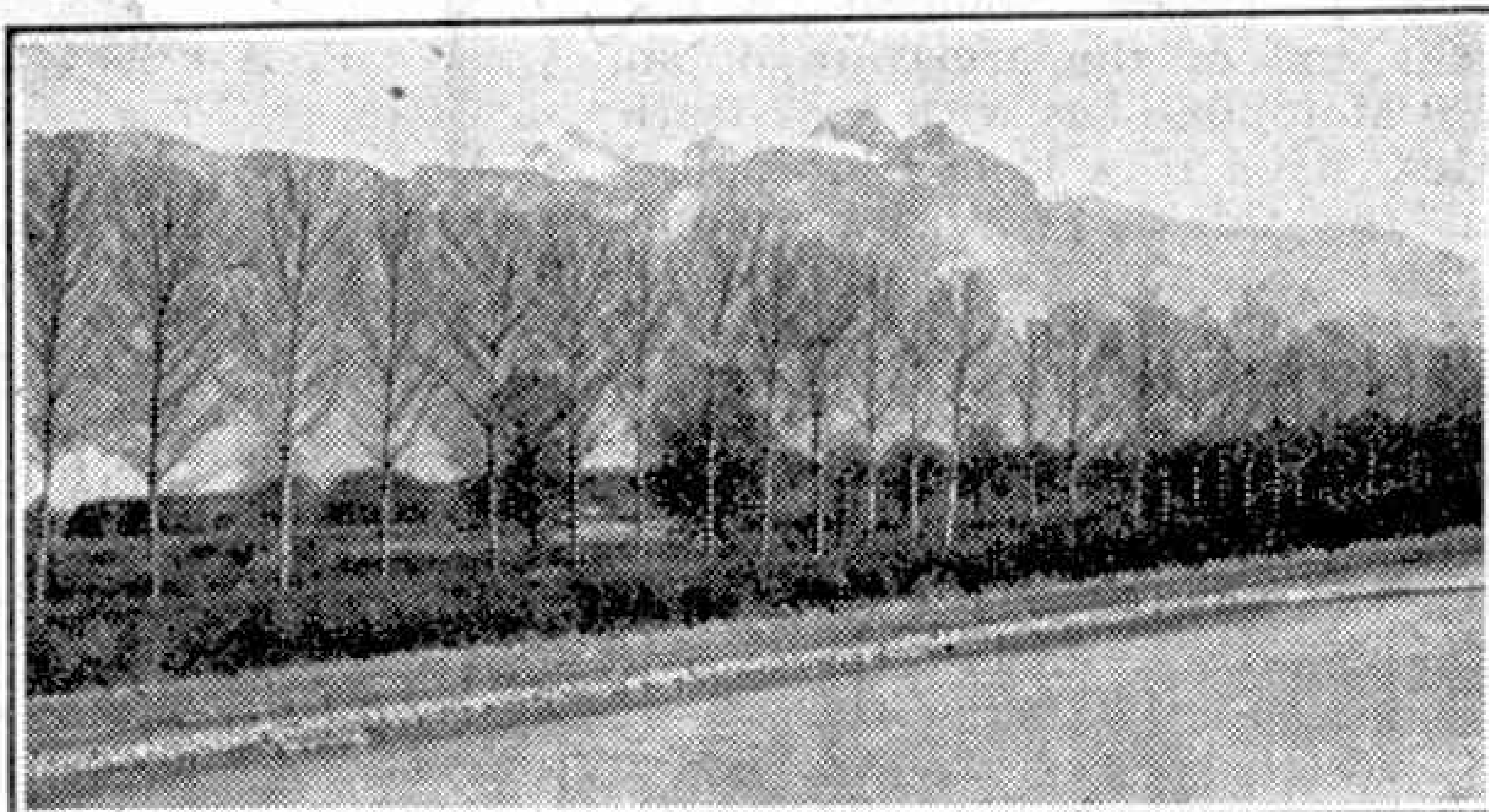
During the last year of my stay in Switzerland before the war I had the good fortune to visit the Rhone Valley, one of the most interesting and picturesque of its kind in the country. The river Rhone begins at the St. Gotthard Pass, and flows south-west as far as Martigny-Croix, where its course swings north-west to Lake Geneva. The Simplon Tunnel railway line follows its course until the tunnel itself is reached, and crosses the river several times by a variety of bridges. Because of the steep valley walls the railway is always near the river, and dykes have been built on each bank to guard against damage by the floods that often occur in Spring. From the line it is possible to catch occasional glimpses of lofty summits through gaps in the valley walls where side valleys join the main one. On clear days such peaks as the Matterhorn and the Weisshorn are plainly visible.

The main object of my visit to the Rhone Valley was Sion, the chief town of Canton Valais, noted for its three great rocks, which have been fortified from the time of Julius Caesar. To-day a church stands on the highest point, and the ruins of a castle lie dejectedly on the remaining granite towers.

In the Rhone Valley we have a classic example of the movement of population according to the seasons, and I was able to witness the movement. It was Spring and the snow was melting on the high pastures, and long lines of cows and goats, accompanied by peasants carrying their needs for their summer sojourn in the High Alps, were wending their way up the steep mountain footpaths that led to the rich grazing grounds from which the Alps derive their name. Here I noticed for the first time an interesting contrast in the methods of transport and communications; although electric railways have penetrated some of the valleys, in many localities the peasants still use the mule for postal services and the carriage of articles.

The Rhone Valley has always been an important commercial route from early mediæval times, and to-day is followed by double-tracked electric railways and first-class motor roads. Before the river enters the Lake of Geneva its valley widens, and the stream itself, which hitherto has been a gushing grey-green torrent, slows down and turns a sluggish brown.

J. W. MILLS (London N.3).



The Rhone above its entry into Lake Geneva. Photograph by J. W. Mills, London N.3.

Suggestions Section

By "Spanner"

(609) Developer Tank Agitator (G. S. Burney, Addlestone)

Although photographic supplies are difficult to obtain in parts of the country, they are more plentiful in some areas, and

of Chain to a 3" Sprocket 7 fixed on the driving shaft of the tank.

In view of the jerky motion of the mechanism it is advisable to incorporate a device to make the motion as smooth as possible. As shown in Fig. 609, this consists of a Flywheel driven through a $\frac{1}{2}$ " Pinion from the 57-teeth Gear 4.

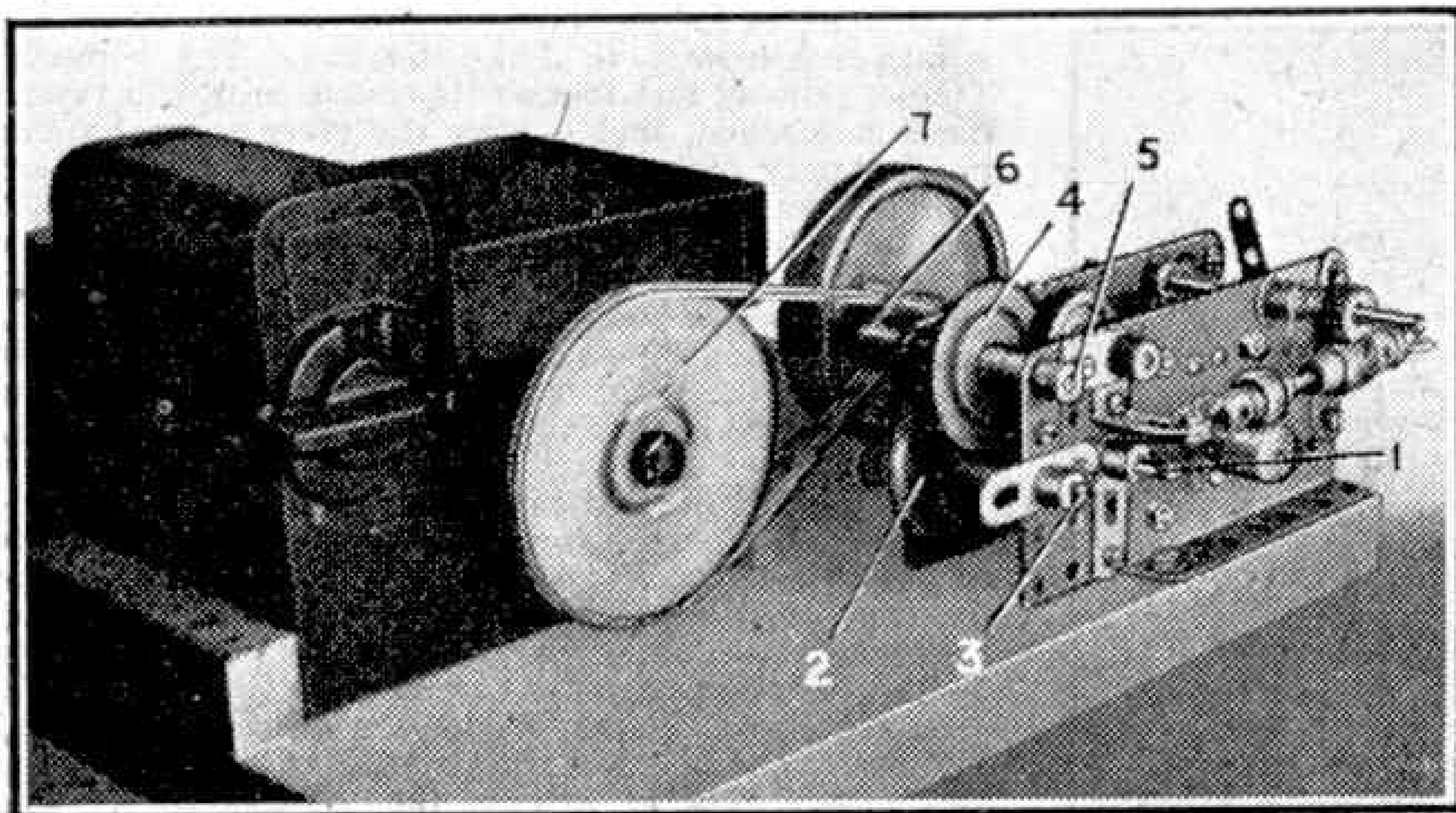


Fig. 609.

I know that many "M.M." readers who are fortunate enough to live in these places are still able to indulge in the hobby. Some time ago one of them, G. S. Burney, Addlestone, sent to me details of a novel device he constructed for agitating the solutions in a daylight developing tank, and I think other readers who do their own developing will be interested in the gadget. It is shown in Fig. 609, where it is seen in conjunction with a Rondinex type tank.

A $\frac{1}{2}$ " Pinion mounted on the rear end of the armature of an E6 Motor meshes with a 57-teeth Gear fixed to a Rod 1 journaled in the sideplates of the Motor. This Rod also carries a second Pinion that engages with another 57-teeth Gear 2 on a Rod 3. Bearings for this Rod are provided by the Motor sideplates, to which are bolted Double Arm Cranks. The drive is then transmitted through a further $\frac{1}{2}$ " Pinion to a 57-teeth Gear 4 mounted on a Rod 5 that also carries a $\frac{3}{4}$ " Sprocket 6. This Sprocket is connected by a length

(610) Clock Escapement Mechanism ("Spanner")

In building a clock mechanism in Meccano, it seems that with most model-builders all goes well until they tackle the escapement or device by means of which the speed of the mechanism is controlled. One method of assembling such a

device is shown in Figs. 610 and 610a.

It consists of an escapement wheel formed from a Face Plate 1, Fig. 610a, to which are attached eight $\frac{1}{2}$ " Reversed Angle Brackets 2. Washers 3 are placed under the heads of the Bolts to ensure that the Angle Brackets 2 are held rigidly. There is also a crutch, which consists of Angle

Brackets 4, Fig. 610, bolted to an arm 5, the latter being formed from two $2\frac{1}{2}$ " large radius Curved Strips bolted on each side of the web of a Crank 6.

The Crank is fixed on a Rod 7, and a 5" Rod 8 is held in a Coupling 9 on the end of the Rod 7. At the lower end of this 5" Rod is a Coupling 10 holding two 2" Rods 11.

The escapement 7 is mounted pivotally in the clock case just above the escapement wheel, and the pendulum, suspended from a suitable pivot, passes through the fork 11. As the pendulum swings to and fro the arm 5 rocks about its axis, so allowing the Brackets 4 alternately to release a

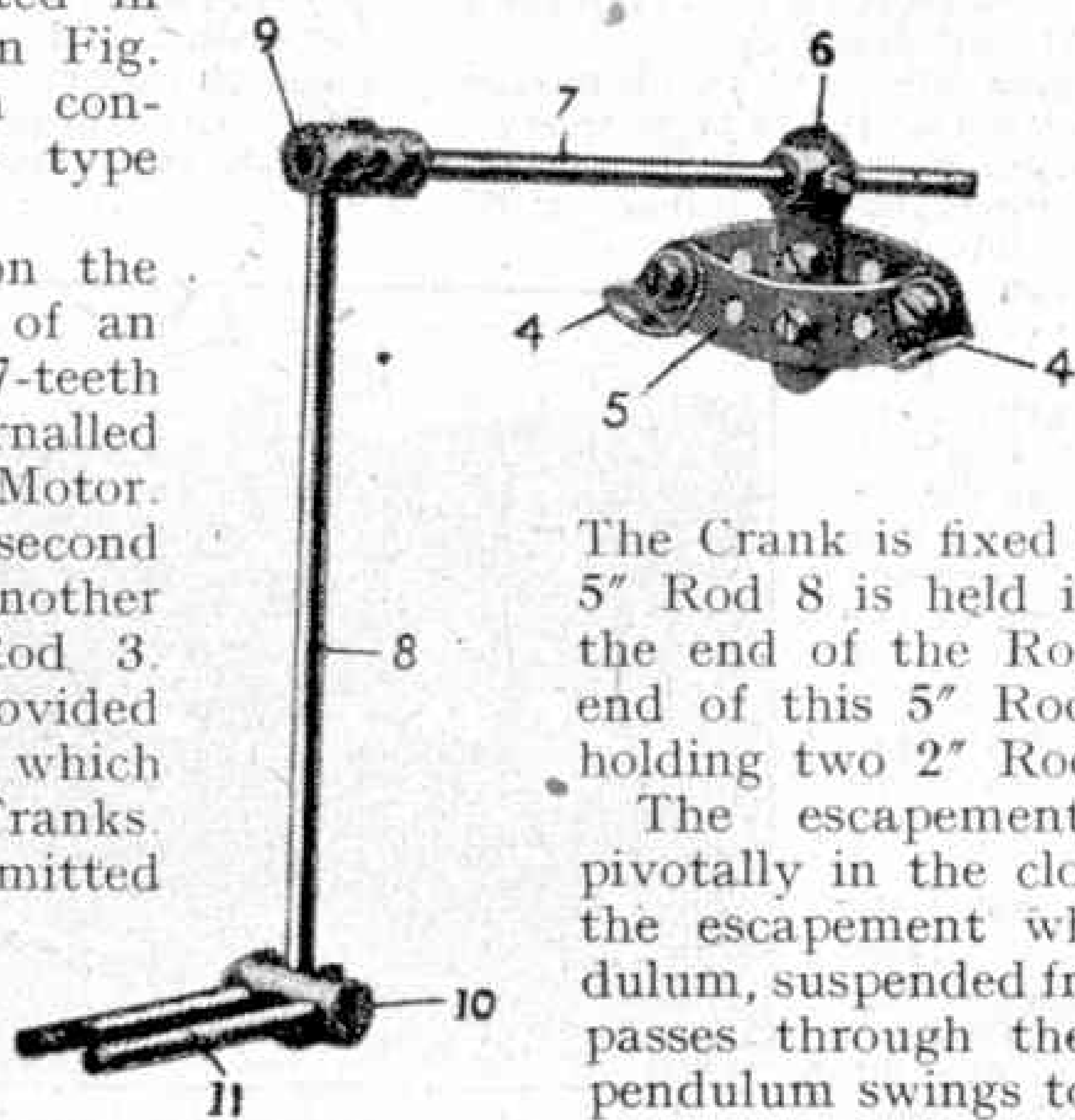


Fig. 610.

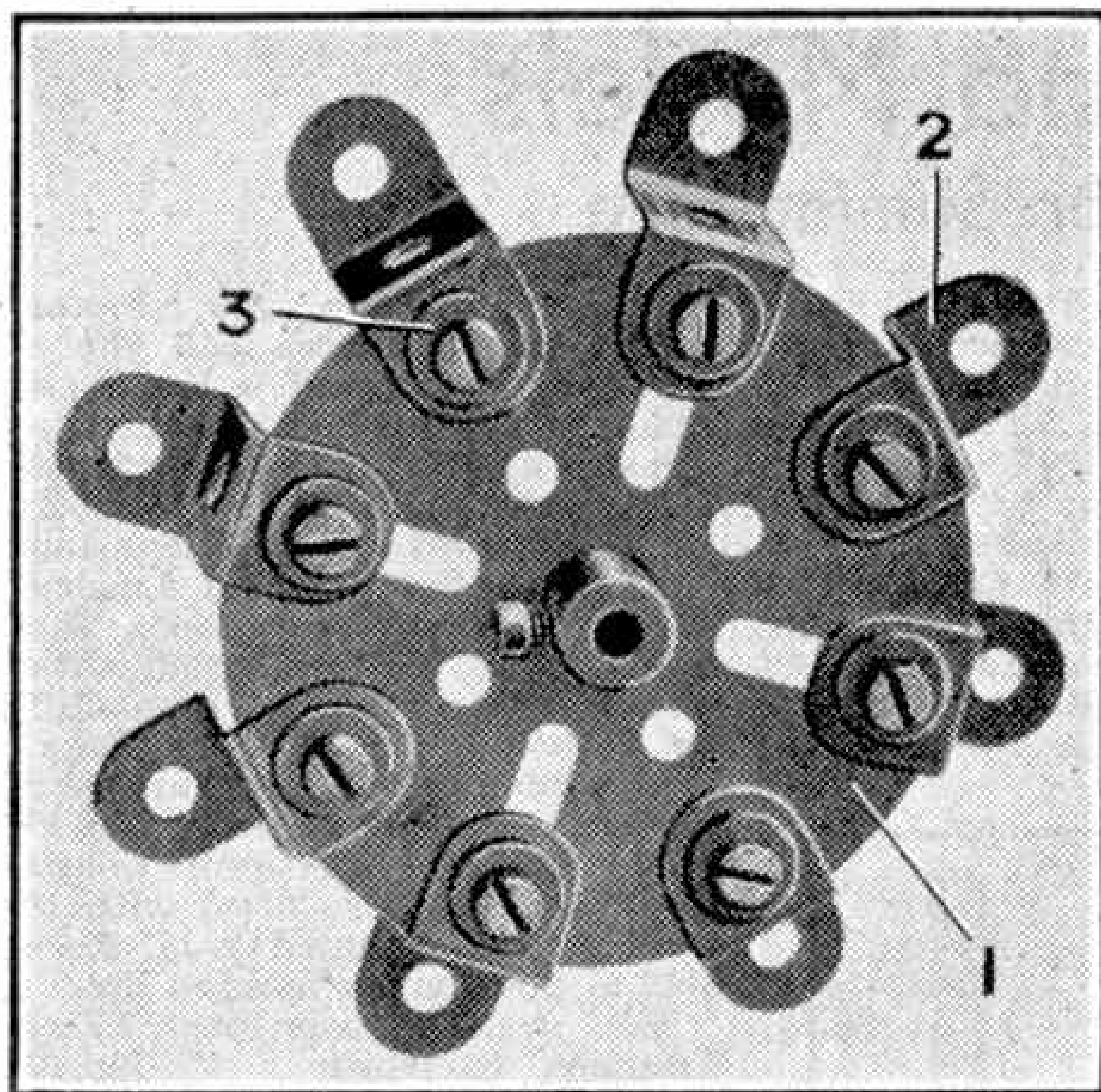


Fig. 610a.

tooth of the escapement wheel 1.

(611) Rotor for a Model Synchronous Motor (G. T. Parkyn, Barnet)

G. T. Parkyn, Barnet, brings to my notice some details of experiments he has carried out with a Meccano clock operated by a synchronous electric motor. He seems to have obtained very satisfactory results and I think that readers of the "M.M." will be interested in Fig. 611 on this page, which shows the rotor of the motor and illustrates the simplicity of its construction.

The motor was designed to run at a speed of 300 r.p.m. from a 50-cycle alternating current supply. The illustration shows that it consists of two Wheel Flanges, bolted to two Bush-Wheels, which in turn are used to secure the unit to the shaft. The Wheel Flanges are not placed in direct contact with each other, but are spaced apart by two 1" Screwed Rods, so that a gap of about $\frac{5}{32}$ " is left between their

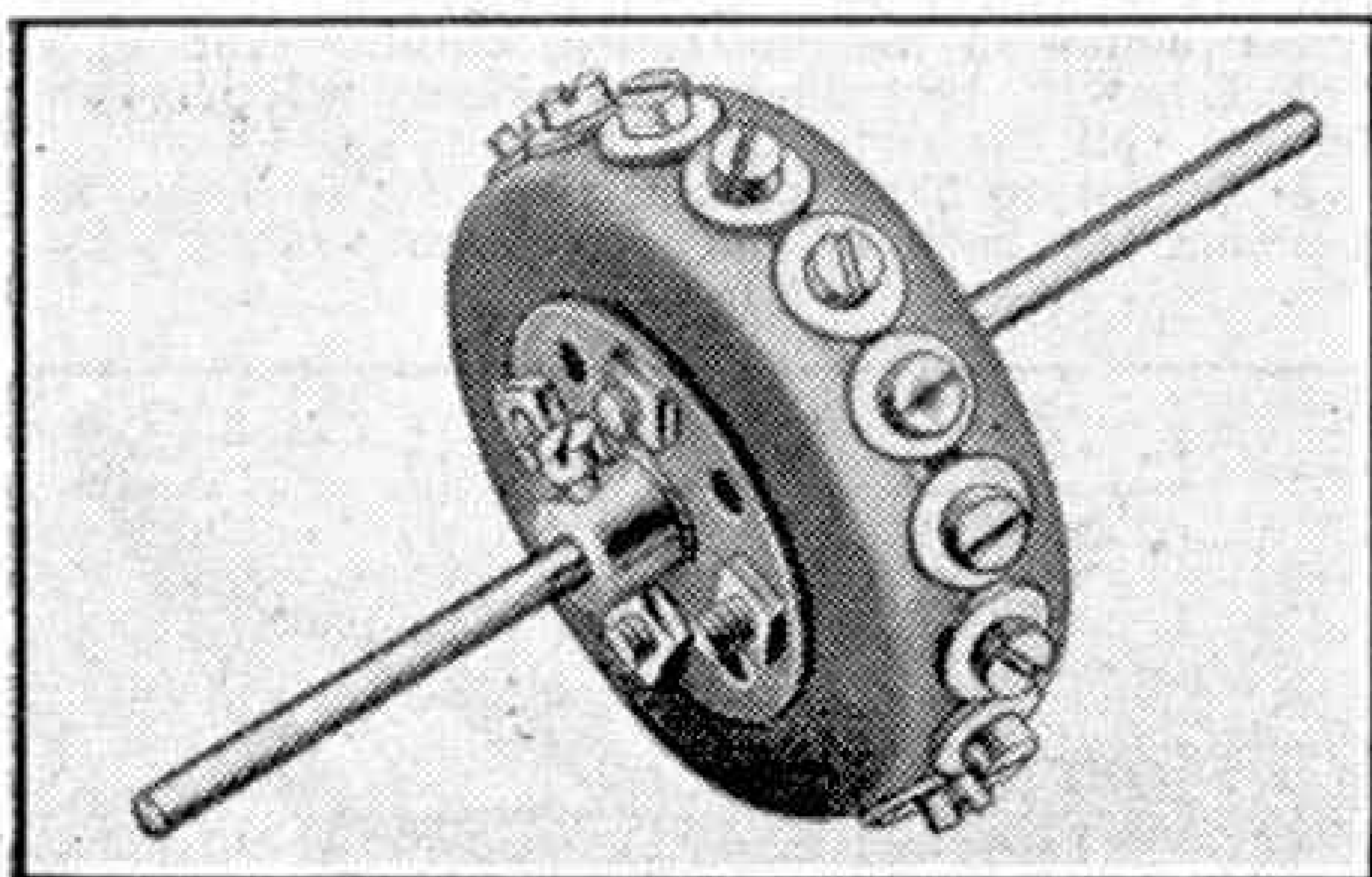


Fig. 611.

rims. In this gap are gripped a number of Bolts and Nuts, which serve as the poles, a Washer being placed under the head of each Bolt as shown. To give the rotor a speed of 300 r.p.m. on a 50-cycle supply 20 Bolts are necessary.

Two points to watch, however, are that the Wheel Flanges are accurately centred on the shaft and that the Bolts are spaced equidistantly.

(612) A Lifting Magnet for Model Cranes ("Spanner")

The pleasure and interest obtained from operating a model crane can be increased by the provision of alternative types of lifting tackle, such as a grab or electro-magnet in place of the more usual simple hook. Various kinds of lifting tackle have been illustrated and described in "Suggestions Section" from time to time, and one more example is shown in Fig. 612 on this page. This is an electro-magnet specially designed for crane work, and it is based on actual apparatus used for lifting iron castings and sheet and scrap metal.

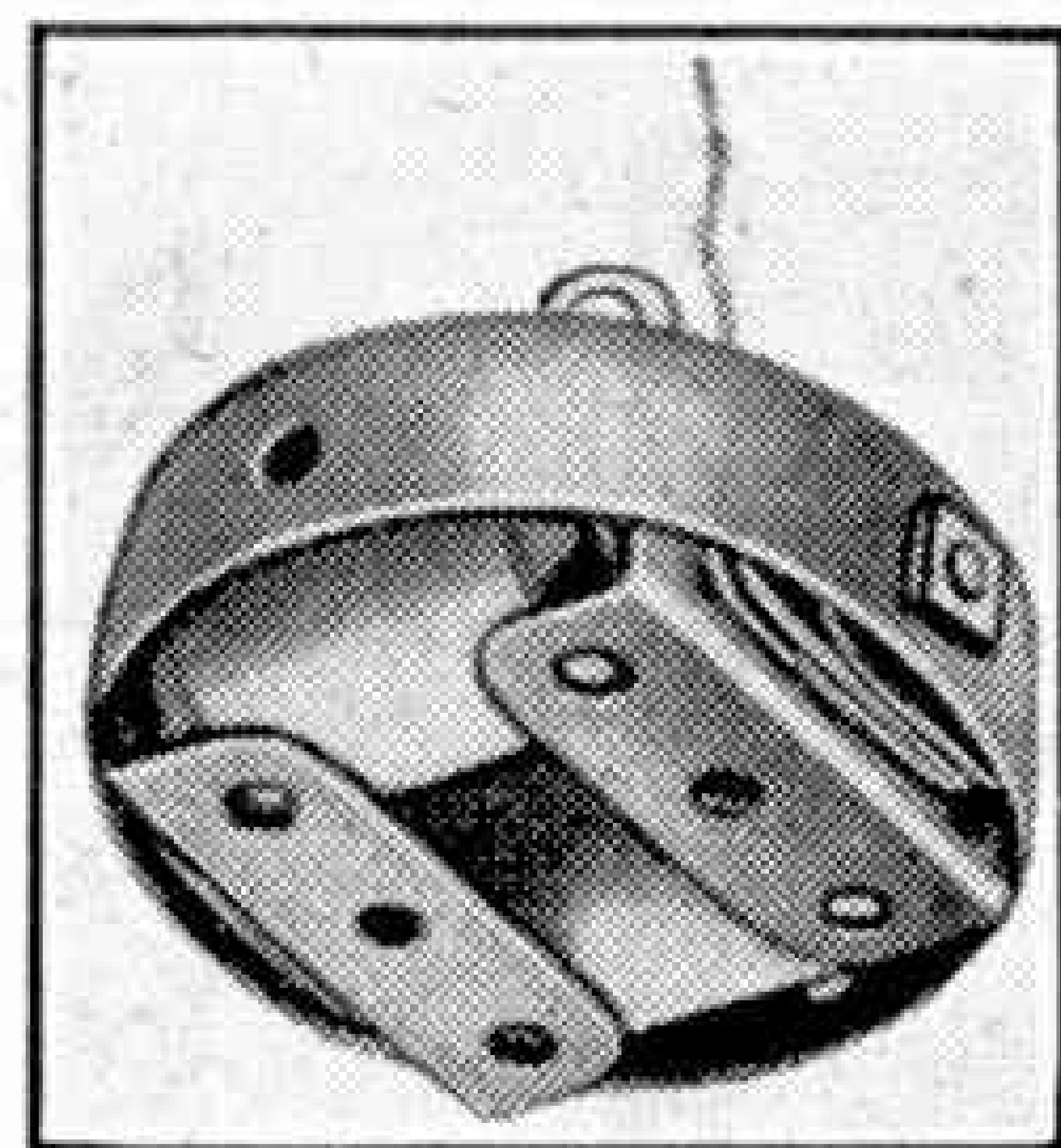


Fig. 612.

The device consists of two Meccano Bobbins fully wound with 26 S.W.G. S.C.C. wire and fitted with pole pieces, each formed from a $1\frac{1}{2}$ " Angle Girder. To the inside flange of each Angle Girder four $1\frac{1}{2}$ " Strips are bolted, and to the outside of the same flange are fixed six Flat Brackets, all these parts being secured by means of a $\frac{1}{2}$ " Bolt.

The coils are fitted with $1\frac{1}{2}$ " Rods forming their cores, and these are inserted in the end holes of the Strips and the Angle Girders, the whole unit then being fitted inside a Boiler End, where it is held in place by Nuts on the shanks of the $\frac{1}{2}$ " Bolts.

The magnet is suspended from the pulley block of the crane by means of an End Bearing secured in the central hole in the Boiler End by means of a $\frac{1}{2}$ " Bolt and Nut. The coils are wired in series by connecting a lead from one coil to one from the other coil; the remaining two leads are then passed through corresponding holes in the Boiler Ends and connected to a 4v. or 6v. current supply.

The magnet is suspended from the pulley block of the crane by means of an End Bearing secured in the central hole in the Boiler End by means of a $\frac{1}{2}$ " Bolt and Nut. The coils are wired in series by connecting a lead from one coil to one from the other coil; the remaining two leads are then passed through corresponding holes in the Boiler Ends and connected to a 4v. or 6v. current supply.

New Meccano Models

Simple Subjects for Summertime

FEW model-builders have much inclination or time during the summer to spend on the more serious kinds of model-building, as they naturally wish to seize every opportunity they can to make the most of the usual outdoor activities. Many of them, however, will find that there are times when showery spells, or the need of a rest after a strenuous game or a cycle ride, direct their attention back to their Meccano Outfits. For such intervals as these light model-building of the type illustrated by the three simple models shown on this and the facing page is excellent.

Our first model this month is shown in Fig. 1, and it

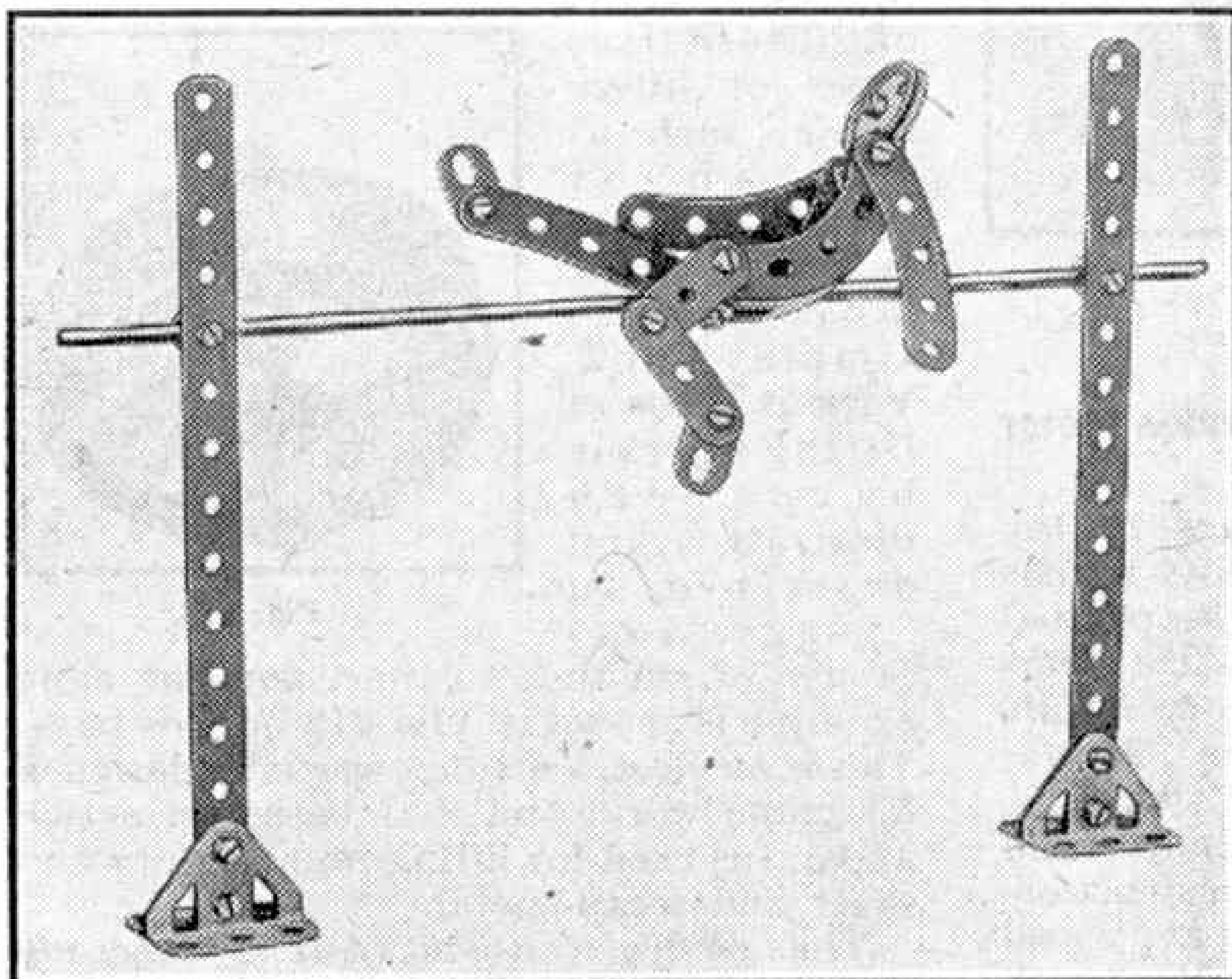


Fig. 1. A Meccano high jump champion with an easy effortless action.

will be seen that it represents a "High Jump" expert in the act of topping the bar. The figure is formed from 2" Cranked Curved Strips and a 3" Formed Slotted Strip bolted to Double brackets and fitted with Curved Strips and Strips forming his arms and legs. The right-hand side of the figure is fixed by means of a Handrail Support on a 11½" Rod forming the bar. The bar is held in Collars fixed by bolts to the uprights.

Parts required to make model High Jump: 2 of No. 1b; 1 of No. 5; 2 of No. 6a; 3 of No. 10; 2 of No. 11; 1 of No. 13; 1 of No. 22a; 14 of No. 37a; 14 of No. 37b; 8 of No. 38; 2 of No. 59; 2 of No. 90; 2 of No. 90a; 1 of No. 111c; 4 of No. 126; 1 of No. 136; 1 of No. 215.

The next model we are describing is a representation

of an aerial flyer that can be built up in a few minutes and when completed and set in action will afford lots of fun. It is shown in Fig. 2 and is based on a 5½" x 2½" Flanged Plate, to each side of which two 12½" Strips overlapped one hole are bolted and fitted at each end to 5½" Strips that are spaced by four Washers. These Strips are braced by 7½" Strips and are fitted at their upper ends with small Loaded Hooks from which the aerial cord is suspended. The centre travelling wheels are 1" Pulleys fitted with Motor Tyres and mounted on a 3½" Rod journaled in 1½" Flat Girders bolted to the Flanged Plate.

Mudguards may be provided by 2" Strips fixed in place by ½" x ½" Angle Brackets. The outer wheels are 1" loose Pulleys fitted with 1" Rubber Rings mounted on 1½" Rods held in position by Spring Clips.

The flyer consists of a Flat Trunnion to which a 1" Pulley representing his head is fitted by means of a Flat Bracket. His arms are 2" Strips held in place by ½" x ½" Angle Brackets, and his legs are 2" Strips fitted by means of ½" x ½" Angle Brackets. He is suspended from the cord by a 1" loose Pulley that is free to rotate on a 1" Rod held in his arms. Platforms at each end of the model are 2½" Strips attached by Obtuse Angle Brackets to Double Brackets joining the 7½" Strips.

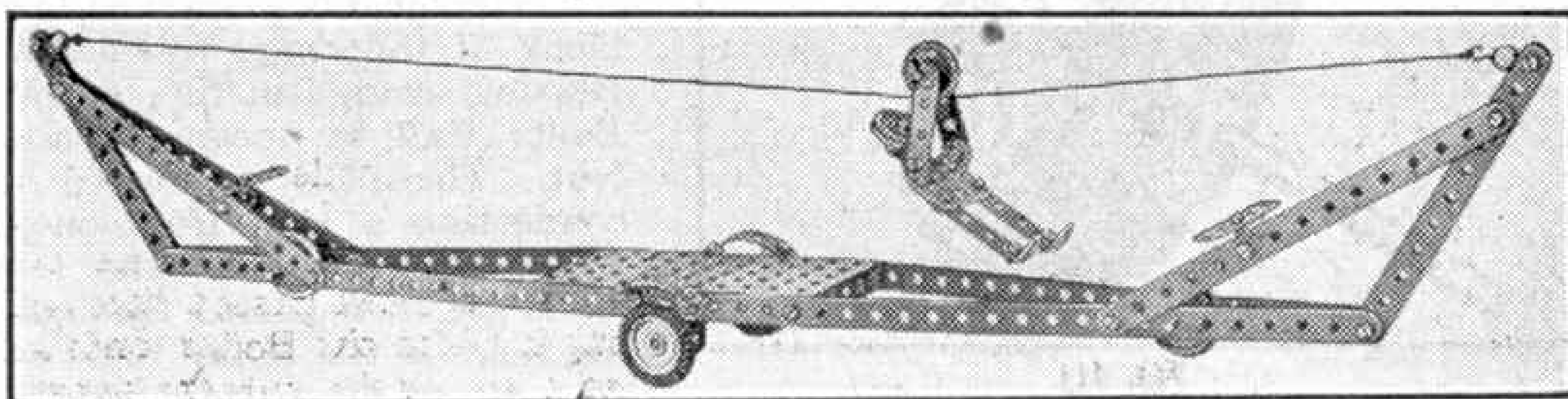
Parts required to build model Aerial Flyer: 4 of No. 1; 4 of No. 1b; 4 of No. 2; 2 of No. 5; 6 of No. 6; 1 of No. 10; 2 of No. 11; 8 of No. 12; 2 of No. 12c; 1 of No. 16; 2 of No. 16a; 1 of No. 18b; 3 of No. 22; 3 of No. 22a; 6 of No. 35; 42 of No. 37a; 35 of No. 37b; 32 of No. 38; 1 of No. 40; 1 of No. 52; 1 of No. 57c; 2 of No. 103h; 5 of No. 111a, 2 of No. 111c; 1 of No. 126a; 2 of No. 142c;

2 of No. 155a.

Combinations of figures representing animals and men can be made to provide very amusing and realistic models if care is taken in their arrangement and pose. For example, we show in Fig. 3 a simple subject of this type that we feel sure readers will agree is both realistic and amusing in effect. It is intended to represent an army muleteer endeavouring to make his reluctant charge see sense and "get started." This particular mule evidently prefers inactive to active service, for judging by his determined stance in the illustration, nothing short of a "block buster" exploding in his vicinity will persuade him to "hit the trail" again!

It is best to begin construction of this model by building the body of the mule from two 3½" x 2½"

Fig. 2.
A simple easily-built model that will give its constructor real fun.



Flexible Plates overlapped three holes, and bent to the shape shown. The neck is a U-section Curved Plate attached to the front of the body, together with two 3" Strips that are fitted with 2½" Strips to represent the front legs. These are spaced apart at their upper ends by a Flat Bracket joining also the sides of the body by ½" × ½" Angle Brackets. The head consists of 1½" Strips fitted with Flat Brackets and spaced apart by Double Brackets, a 1½" × ½" Double Angle Strip being fitted to the front of these.

The body is shaped by 2½" Curved Strips 1 and spaced apart at the rear end by a 1½" × ½" Double Angle Strip to which a 1½" Disc is bolted. The rear legs are Strips bolted in the positions shown.

The animal's load consists of the travelling wheels and axles of a field gun. The wheels are suspended by lengths of Cord from a Channel Bearing bolted to 3½" Angle Girders fitted on the animal. The axles are 4½" Rods 2 lashed in place by Cord.

The man consists of two U-section Curved Plates, the lower ends of which are overlapped two holes. His arms and legs are 2½" Strips. His head is a 1" loose Pulley shod with a Rubber Ring and fitted to his

body by a ½" Reversed Angle Bracket. The figure is arranged to stand at the angle illustrated by means of ½" × ½" Angle Brackets attached to his feet, the edges of the Angle Brackets giving a substantial grip on a wooden or cardboard surface.

In order to obtain the best and most humorous effect with this model care must be taken to arrange the limbs of both the animal and the man in a realistic manner. This is quite easy, however, and the illustration shows exactly what is required.

It is equally simple to arrange the limbs in other

ways, and to alter the pose of the figures to create various other effects. The model-builder will find it an interesting diversion to experiment in this direction.

Parts required to build Army Mule and Man: 2 of No. 4; 6 of No. 5; 4 of No. 6; 6 of No. 6a; 2 of No. 9b; 7 of No. 10; 2 of

No. 11; 5 of No. 12; 2 of No. 15a; 2 of No. 19a; 1 of No. 22a; 42 of No. 37a; 42 of No. 37b; 3 of No. 38; 1 of No. 40; 2 of No. 48; 2 of No. 90; 1 of No. 125; 1 of No. 155a; 1 of No. 160; 2 of No. 190a; 3 of No. 199; 1 of No. 217a.

We shall be glad to receive any suggestions for new "limb" effects for this mule model.

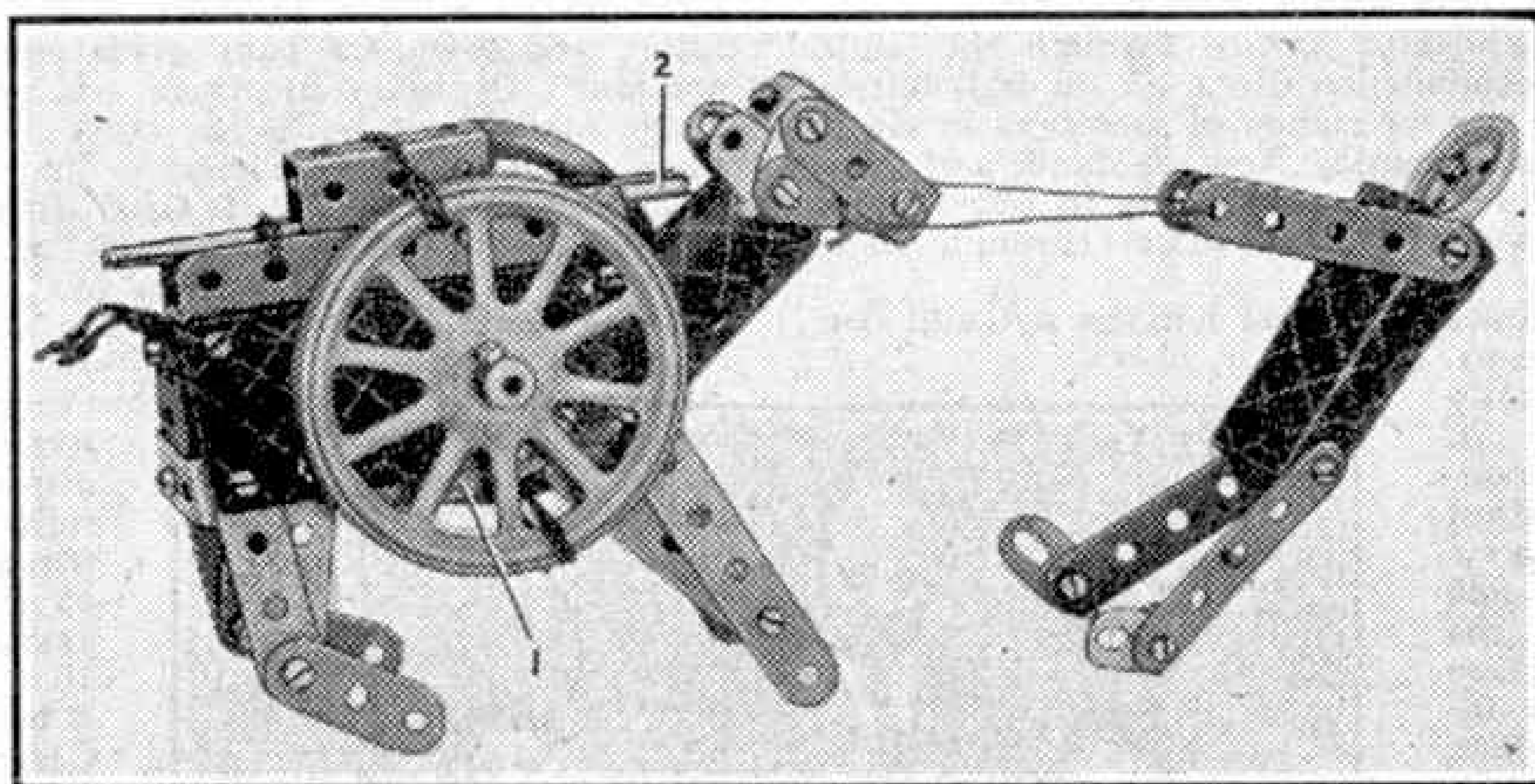


Fig. 3. Trouble in the mountain passes. A mule of a mountain battery showing his stubborn temper.

Summer "Sharp Eyes" Contest

The "Sharp Eyes" contest that we announced last month still remains open, and there is plenty of time for model-builders to prepare and send in their entries. It is concerned only with models built with the use of small Outfits, so that every enthusiast has a splendid chance of winning one of the many fine cash prizes offered. There is no model-building to do; all that a competitor needs to enter for the contest is a copy of the Meccano Instructions Manual for Outfits Nos. 0-3, a pencil and a postcard.

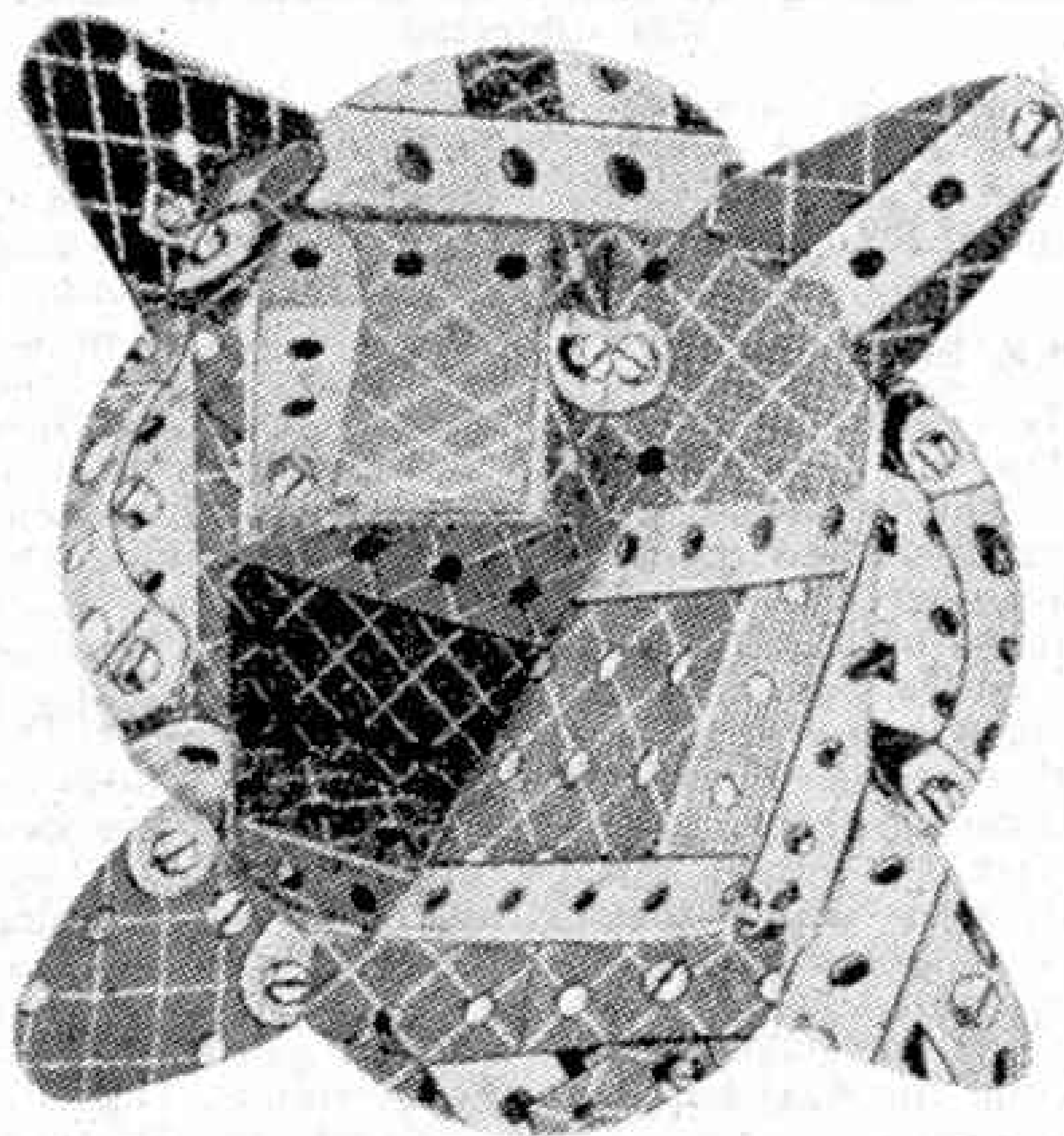
The star-shaped design that appears on this page is made up of pieces cut from illustrations of models in the Meccano Instruction Manuals for Outfits Nos. 0, 1, 2 and 3. Readers are asked to write down, on a postcard, the Manual numbers and the names of the models concerned.

On careful inspection of the illustration competitors will soon be able to "spot" the sources of a number of the fragments that have been used. The actual Meccano Parts and the way in which they are arranged in various pieces will help considerably in solving their identity.

It should be noted that the fragments are not necessarily printed here in the same positions as they are to be found in the Manual. Some may be upside down, and others sideways. Another point that entrants should bear in mind is that they should send in their entries even if they have not traced all the fragments to their sources. Other competitors may be in the same position, and in any case, the prize list is a long one and the awards will be awarded for the best entries in order of merit, so that one in which all the fragments have not been identified may easily win one of them.

The competition is open to readers of all ages and is divided into two Sections, "A" for competitors in the British Isles and "B" for Overseas competitors. Each competitor is allowed one attempt only.

Prizes in each Section: £2/2/-, £1/1/-, 10/6; five consolation prizes of 5/-. Address entries: "Sharp Eyes Contest, Meccano Ltd., Binns Road, Liverpool 13." Closing dates: Home, 31st August; Overseas, 27th February, 1944.





Club and Branch News



WITH THE SECRETARY

THE CORRESPONDENCE CLUBS

Most of the friendships formed through the Guild and H.R.C. Correspondence Clubs go on indefinitely and to-day there are thousands of members in Great Britain, Australia, Canada, New Zealand and elsewhere who write regularly to friends in other parts of the world that they have made through these organisations.

There is no knowing to what lengths a Guild correspondence may go.

I have heard of many instances where in later years correspondents from far distant countries have eventually met each other. One of the most striking of these meetings brought together E. S. English, a British member, and E. Blackburn, a Canadian. In the wanderings that war conditions bring to many of those in the Services the two at last met. The immediate result was that the Guild friendship extended to the families of both, and the most recent letter from E. S. English tells me of his engagement to his friend's eldest sister!

It is not easy in wartime to find new correspondents in overseas countries, but I do my best to satisfy all who join the Club. Members are particularly wanted in Australia, New Zealand, South Africa and American countries, and I shall be glad to send entry forms to Guild and H.R.C. members there.

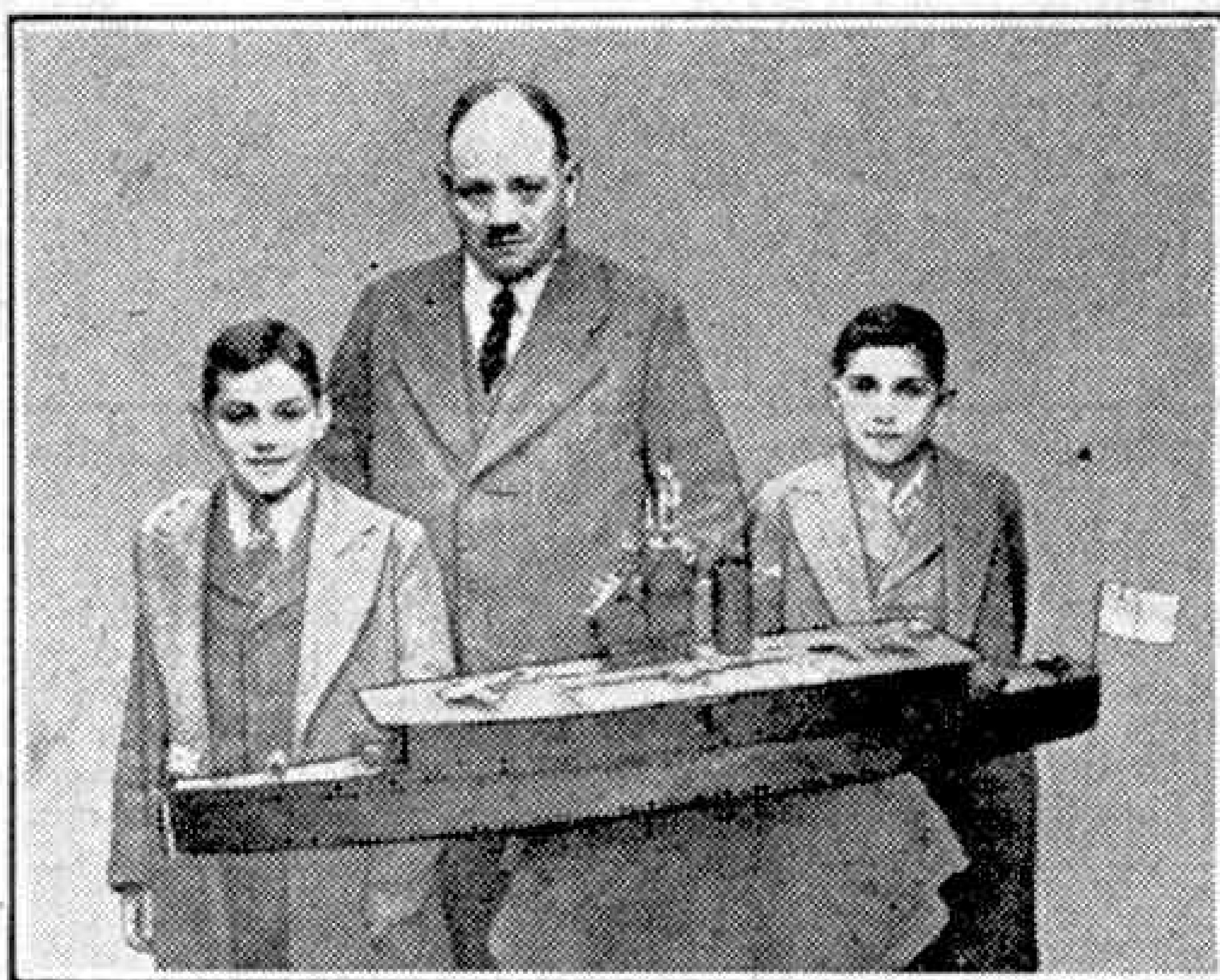
MECCANO IN MALTA ROCK SHELTER

Malta, G.C., figured prominently in my correspondence recently, when I received the fine photograph that is reproduced on this page. This shows Lewis and Francis Portelli, keen Guild members and model-builders, with their father, who is equally devoted to the pleasure and interest of model-building. The Portellis suffered heavily in the severe bombing to which Malta was subjected, and spent many hours in the rock shelter they had dug for themselves. Through those terrible times Meccano was always in their hands, and it must have helped them greatly. It is not surprising to see that the model with which they have been photographed is that of an aircraft carrier, for vessels of this type played a prominent part in the passage of the convoys that sustained the Island and brought it aid in the task of repelling the Axis forces.

PROPOSED CLUBS

HOVE—Mr. G. T. Fox, Kenton Court Hotel, 10, Cromwell Road, Hove 3.

STRATFORD-ON-AVON—Mr. J. B. Graham, 17, Evesham Place, Stratford-on-Avon.



Two Maltese members of the Guild, Lewis and Francis Portelli, with a model of H.M.S. "Illustrious" they have built. With them is their father, who is also keenly interested in Meccano. Model-building was the chief solace of the Portellis while in their shelter during the many air attacks to which Malta was subjected.

CLUB NOTES

CAMBRIDGE M.C.—Mr. F. Collins has kindly accepted Leadership. He has demonstrated the working of the lathe, and members have made gear wheels on this machine. Ordinary meetings are held twice weekly. Large models are built, the most recent being an air liner. Games also are played and books are read. Club roll: 13. *Secretary*: J. G. B. Hughes, Southmead, 43, Hurst Park Avenue, Cambridge.

GRAVESEND COUNTY SCHOOL M.C.—Steady progress is being made with Model-building and other pursuits.

In a Model-building Competition entrants were asked to build miniature funicular railways. Model aeroplane flying is part of the summer programme. Club roll: 10. *Secretary*: A. H. Underwood, 30, Clarence Place, Gravesend, Kent.

NAVENBY M.C.—Summer meetings are being devoted chiefly to games and sports, which are carried on in the Club room in wet weather. General arrangements are being made for an Exhibition, and a committee of four members has been appointed to take control of this effort. Club roll: 15. *Secretary*: P. I. Addison, High Street, Navenby, Lincs.

AUSTRALIA

MELBOURNE M.C.—

In an interesting contest members were required to pick up a bag from a truck and unload it on the goods platform of the Club's layout, using an electrically operated Meccano gantry crane. One member accomplished this in 1 min. 25 sec. and won the prize. In a second contest an electric train running round an oval track had to be stopped at a definite spot, or as near as possible. Operations on the Club track have continued and have included the running of a coal train after filling it with the aid of a Meccano grab. Cycle runs have taken members to places of special railway interest. Club roll: 12. *Secretary*: L. Ison, 8, Hayes Street, Northcote, Melbourne, N.16.

BRANCH NEWS

DURHAM SCHOOL—Recent meetings have been devoted to laying down a new track and improving running on it. The results have been excellent. Signalling is now being taken up, and operations on a regular timetable basis will begin shortly. Arrangements are being made for Lectures by members on railway and similar topics. *Secretary*: P. G. I. Green, Poole House, Durham School, Durham.

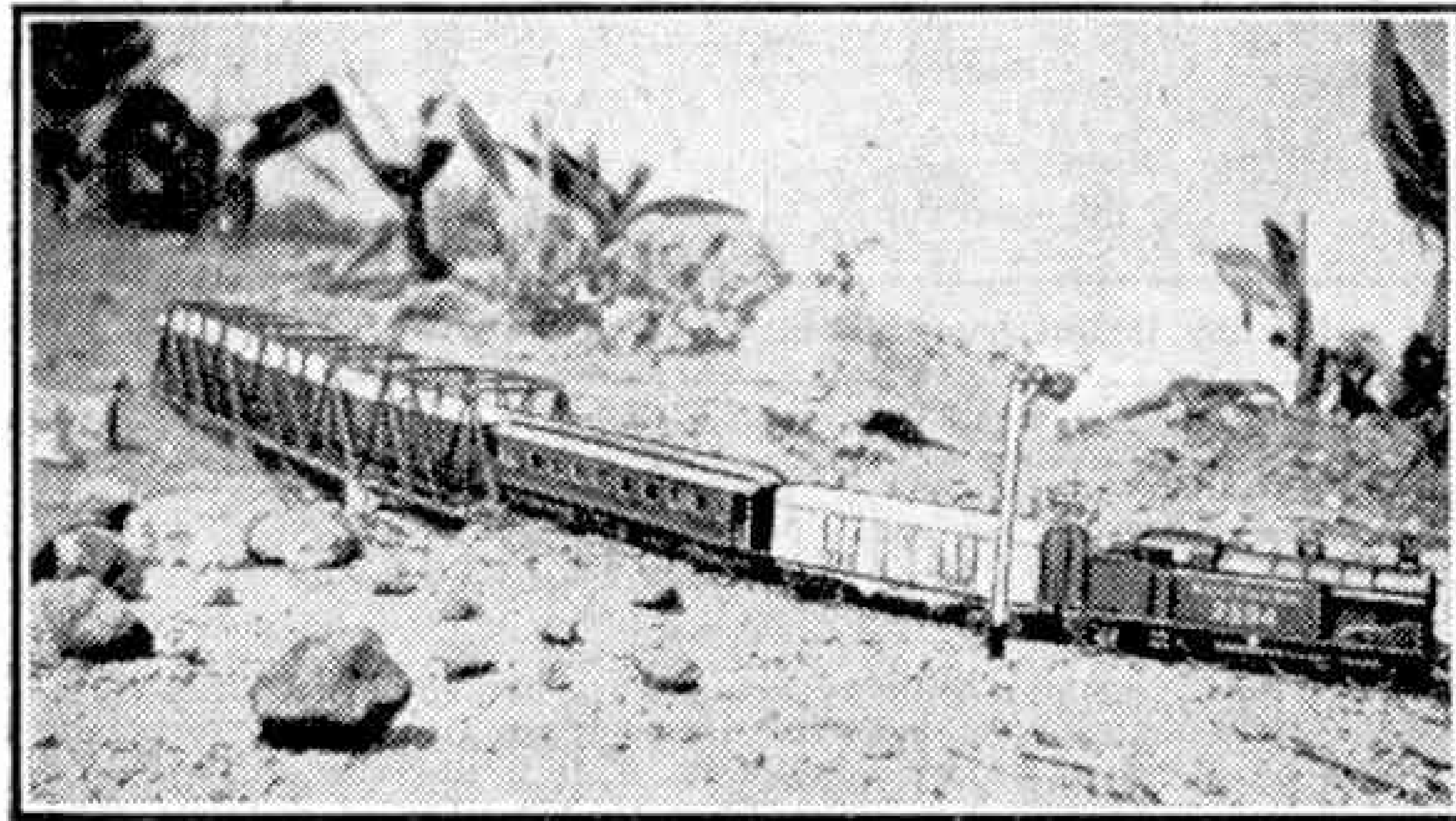
WATERLOO (DUBLIN)—Recent improvements to the layout, which represents the Kent and East Sussex Railway, have included the construction of a Meccano bridge. Scenic additions have also been made. *Secretary*: S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

Improving the Appearance of Dublo Layouts

STATIONS, signals and various other accessories are included in the Dublo System, and we have often given hints

it can be made to follow the curves of the track.

Road overbridges can be made from wood or card according to individual skill and the material available. For beginners there is much to be said for the old favourite scheme of cutting openings in opposite sides of an inverted cardboard box of suitable size to make a bridge for the trains to pass under. Side walls are then planted on the actual bottom of the box, which now becomes the roadway. Sloping approaches are not difficult to arrange.



Some of the equipment of Mr. D. H. W. Parsons, Johannesburg. The realistic bridge referred to in this article will be noted.

on how to use these to advantage. There are, however, various other items for use actually on the railway or along the line, that can be adapted or contrived by the ingenious Dublo "engineer."

Certain ready-made articles can be used successfully, such as the Pavement Sets of the Dinky Toys Series, which have often appeared in our illustrations. Failing these a few pieces of the greyish-tinted cardboard that is often used for cartons can be used, and with a little work with a ruler and pencil quite good paving sections can be made. Such pieces are useful in many different places on the layout, such as in Station approaches and round about any lineside buildings where a little paving is required.

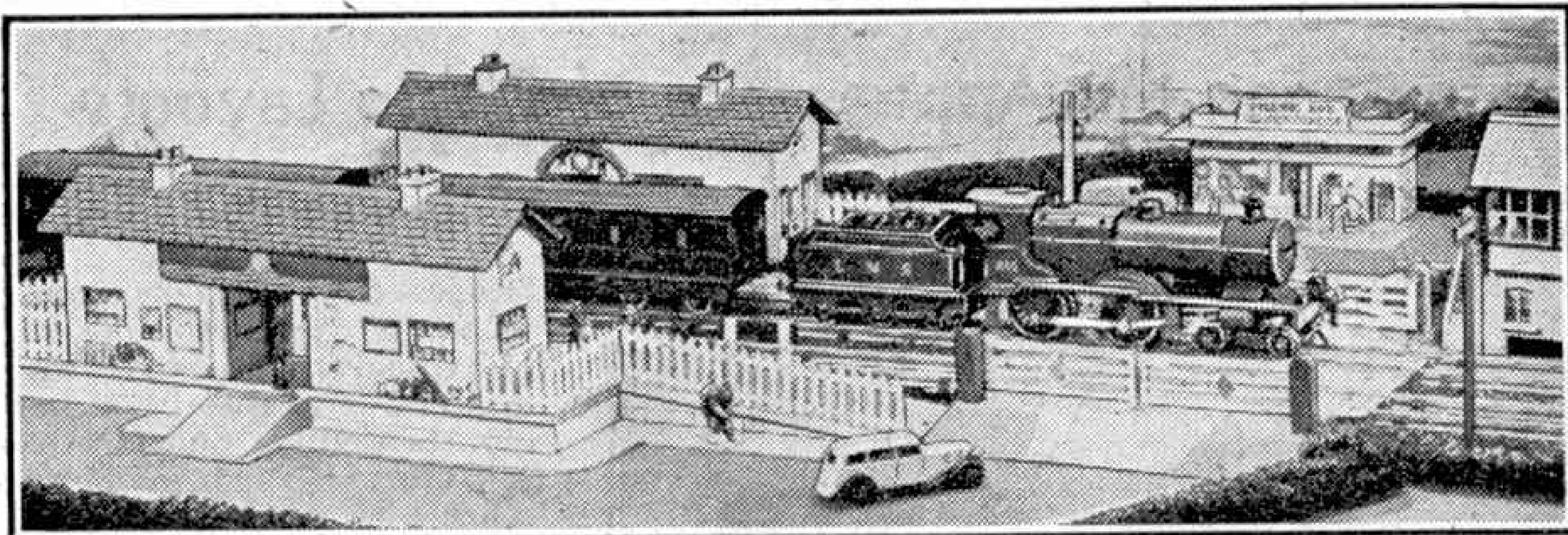
In real practice our railways are compelled by law to fence in their tracks. Although we have more latitude on our Dublo lines, we should wherever possible provide some form of enclosure for the tracks. Hornby Hedging can be used effectively, or a "sleeper fence" can be made very quickly from strips of cardboard ruled up to represent the sleepers. This latter material has the advantage that

Open footbridges provide a more severe test for the constructor, so that it is probably safer to model the covered type of bridge and stairways as used to connect station platforms. These can be made solid, the windows, timbering and any other features being drawn or painted on. The use of this type of bridge means that in the open country a level crossing may be necessary. Matchsticks can be used for the gates, as they do not really have to work. Thicker pieces are needed for the main gate posts; a wooden skewer or a pencil cut up will do nicely if we have nothing else. For the actual crossing path or roadway cardboard can be used.

Those keen on fine woodwork will be interested in the bridge shown in the upper illustration on this page. This is the work of Mr. D. H. W. Parsons, of Johannesburg.



A Dublo express passing through a Station. The road bridge in the background was constructed as described on this page.



A clockwork-hauled express on a Hornby layout passing over a Level Crossing.

Gauge 0 Operating Schemes

THE development of a miniature railway system, even in normal times, is subject to various restrictions, and in order to get the utmost fun from operations the model railway owner has to make the best of them. In this article we show how an interesting operating scheme can be developed as a result of various restrictions.

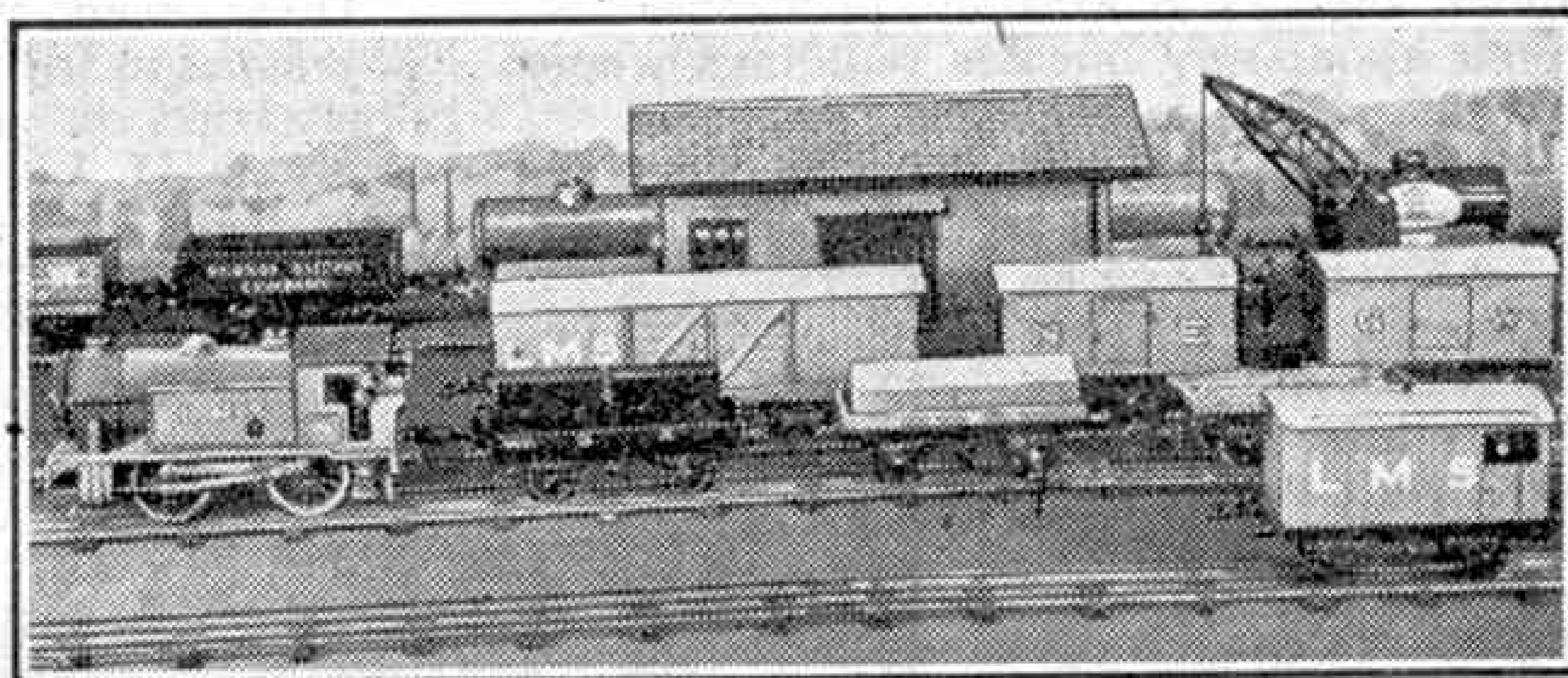
Probably the greatest "bogey" on miniature railway development is restricted space. In the earliest days of our model railwaying, however, this does not bother us much. We have a small circle or oval of track, and on this our engine and its train run quite satisfactorily. Then comes a time in which bigger layouts are tried, and often trains of very varied make-up are run on them. Gradually, however, we discover—partly through reading the "M.M." no doubt!—that certain layouts have advantages over others, and that correct train formation makes things far more interesting.

Then we reach the stage of having developed our track to the limits of the space available, and have probably adopted a track plan that fits in best with our ideas. We may make little alterations each time we put the layout down, but the main scheme remains the same. So we are able to follow up a more or less regular scheme of working, although we may not go to the extent of running our trains at definite times. So far, so good. As a general rule, however, at about this stage of development we are apt to experience a slight feeling of disappointment that our model trains are not as long in comparison as the real ones we are accustomed to see. But if they were, our sidings would not be able to accommodate them, and our locomotives, even electric ones, would have difficulty in dealing with them.

Clearly then we must adopt an operating programme that takes advantage of these restrictions. One that has been applied with success in miniature may be described as an adaptation of the traffic operating or "Control" system first applied in this country by the former Midland Railway. Traffic regulating or control schemes are in use on present-day systems, but the highly-developed "Midland" system is one that fits in particularly well with model practice. A series of light fast expresses is just what we require

on our railway; clockwork-hauled trains run fast, and each type of engine gives its best performance with a particular load. This is not the greatest load that it will move, but the number of vehicles with which it will "keep time" over a respectable length of run. With electric locomotives there is no need to worry about the length of run, but the number of coaches that can be handled comfortably will vary according to the size of the engine, as is the case with clockwork engines.

In the Midland system just referred to, loads for each class of engine on particular schedules were drawn up, so that if we make a few tests on our own layout we shall soon be able to determine what is to be the loading of our trains. Then we shall find, most likely, that our stations and sidings will be able to deal with such trains just nicely in the ordinary course of working. One point that will arise on clockwork railways will be the need for bringing the trains to a stop at the station platform without the need for installing a large number of Brake Rails all over the system. With standard loads it will not take us long to find out exactly how many turns of the key are required to enable each engine to move its train from point to point. We make a note of this information, and include it in any "Working



Making up a freight train to the required number of vehicles; the engine is a No. 1 Special Tank.

Notices" that we may prepare. This sort of thing is specially useful when several boys are working together.

From this we shall probably pass on to a scheme that is often adopted in miniature as in real practice—that of assembling our passenger stock into "set trains." Two, three, or four-coach formations can be made up, and the individual vehicles kept together as a unit for different services.

The Westcliff Branch Gauge 0 Railway

IN July 1940 we described the Gauge 0 miniature railway system owned and operated by our reader P. R. Wickham, of Leicester, as it was at that time. Since then considerable developments have taken place that have altered somewhat the character of the line, so that further details of the system will be of interest.

From an imaginary branch of the L.M.S. the line has now become a "freelance" independent concern known as the "Westcliff Branch Railway." It is, however, still operated in association with the L.M.S., for there is supposed to be an extension of the line beyond "Enderleigh," one of the stations, which links up with the L.M.S., and close inter-working is the rule. To support this scheme the station at "Enderleigh" is to be rebuilt so that the tracks pass through and connect with a concealed turntable. This permits the station to be worked as a terminus, although it will look like a through station.

Later, further developments "off-stage," or out of sight of the observer, will include two long sidings laid on a separate length of board that can be attached to the raised structure to make an end-on junction where the turntable now is. The latter will then be moved to the outer end of the sidings. Trains will then run through the station unless required by the time-tables to stop there, on to one of the sidings. Then the engine will be turned and re-attached to the train, ready to come back to the station. The train will remain "off-stage" long enough to complete its journey to and from the imaginary junction where the L.M.S. is joined. Next it will re-appear at "Enderleigh" and be worked back to "Westcliff" at the other end of the "branch" line.

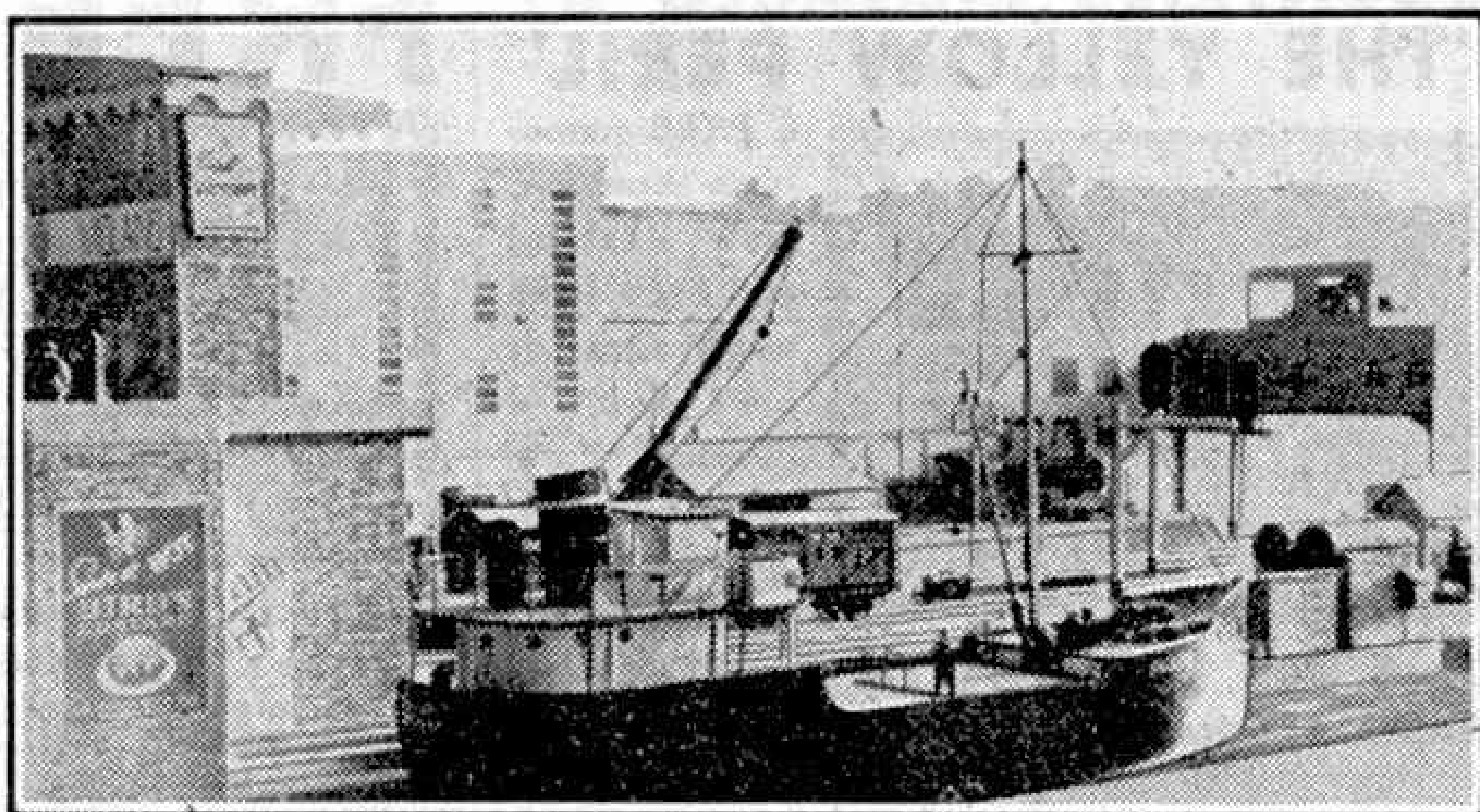
In present conditions it has not been possible to amplify the stock to any great extent, so that attention has been concentrated on lineside and scenic items. The most striking of these appears in the illustration on this page. This shows the harbour basin and quayside by "Westcliff" station, with a coasting vessel alongside. The water has been modelled effectively by the use of crumpled cellophane glued over a surface painted blue-green. The result is excellent, as can be seen from the illustration. Harbour walls, dock gates, and so on are to be added and these will further improve the realistic scene. The coaster represents a modern motor vessel and the hull is made of those favourite materials, wood and cardboard; a final touch of realism in the finish is the painting of loading marks on the side of the hull. Hatch covers are removable, so that loading and unloading can be carried out by means of the dockside crane. Metal deck fittings, funnel and boats complete the model, which is duly marked "Falcon" on the stern, with the port of registry "Liverpool" appearing below. The mast is a Meccano Axle Rod!

Two items that were notable features on the old system have been improved, especially the miniature street at "Westcliff." More detailed buildings with "glazed" windows have replaced most of the original structures. These now include a bank, a modern store and a dress shop, and by way of contrast there is a "half-timbered" hotel. Elsewhere the river valley

and viaduct near "Enderleigh" and the river banks have been remodelled. A romantic ruined castle of wood and card, complete with moss green walls, has replaced the more industrial lime works that figured in the previous article.

An interesting point about the present illustration is that in the background it includes a splendid view of the northern end of the railway yards at "Westcliff," including the passenger platform, goods yard and the overhead signal box controlling the entrance to the station. This box has inside it a dummy control panel, with track diagram as used in modern signalling schemes. Colour light signals are now installed, which although dummies are most effective in appearance. Their modern aspect is thus in keeping with the up-to-date character of the overhead box and its control panel.

With the alteration of the general scheme of the line changes have been made in the locomotives and rolling stock. The original Hornby clockwork



A dockside scene at "Westcliff," on the layout of P. R. Wickham that is described on this page.

mechanisms and wheels of the engine have been retained, but new superstructures to the company's own designs have been provided. Cardboard has been used as the chief building material and this is quite successful when, as in this case, it is soundly fixed and finished with enamel. There are three locomotives in service. One is a 4-4-2 tank, No. 7, used for both passenger and fast freight traffic. Then there is No. 6, an 0-4-2 for general freight work; the use of the wheel arrangement is interesting as it was once quite a favourite in this country, and a few old outside-cylinder 0-4-2s survived in Scotland until comparatively recent times. Shunting and light freight work is performed by No. 8, a 0-4-0 "pannier" tank that is based on the numerous and useful 0-6-0s of this type on the G.W.R.

Swindon practice also is followed in the use of a monogram in decorating the engine, for the "W.B.R." design is similar to that adopted by the G.W.R. and still in use to a certain extent. The monogram of the "W.B.R." is carried out in golden yellow on the side panels, the engine being painted black and lined out in dark blue.

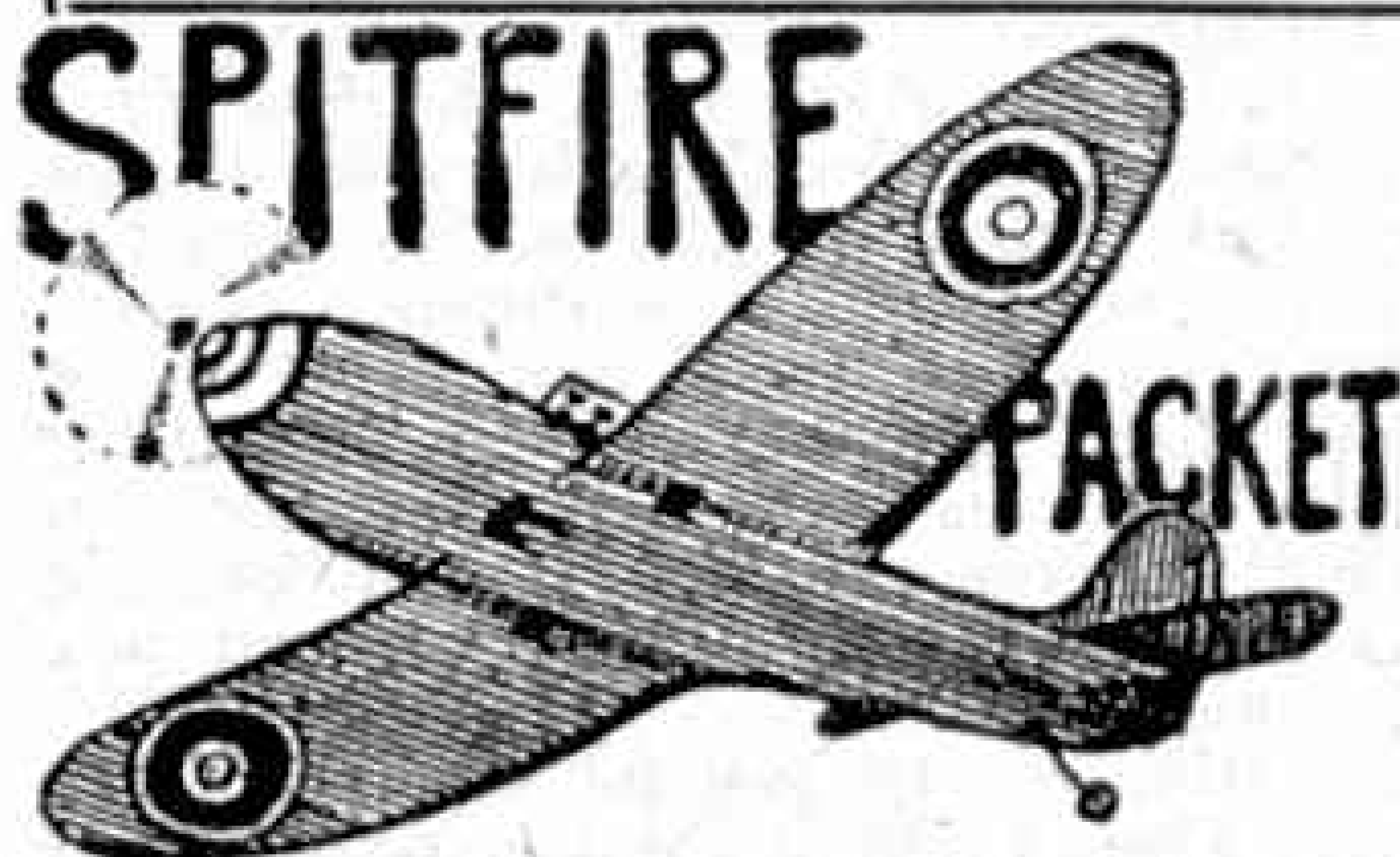
Hornby bogies and frames have been used in the construction of two new passenger coaches. The bodywork is of cardboard; our reader Wickham is evidently an expert in the manipulation of this material. These coaches are of the normal compartment type and include the main exterior details, while the window openings are "glazed."

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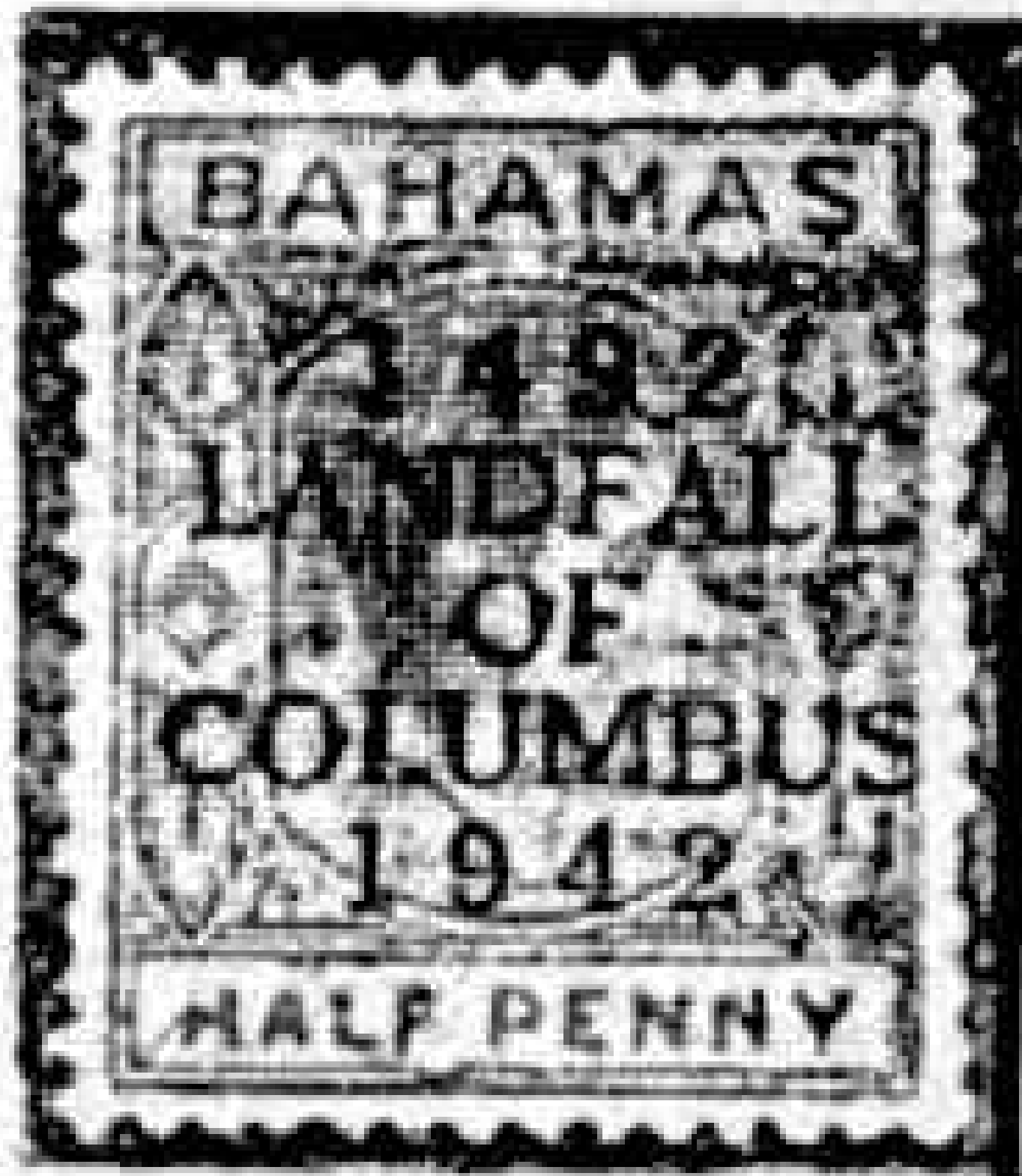
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For other Stamp Advertisements see pages 284 and v.

Stamp Collecting

Stamps of the Free Countries. No. 4 Zanzibar

By F. E. Metcalfe

FEW place names sound more romantic than Zanzibar, and indeed few places actually are more romantic than this tropic isle set in the Indian Ocean, just east of Tanganyika. Not a great deal has been written about it, but one American authoress mentioned in one of her books that nobody can be considered travelled until they have taken a trip on the Bububu Railway.



Not many have even heard of such a railroad, but there it is, in Zanzibar of all places, running for seven or eight miles from the coast to the clove plantations; and to see the one and only train clanging through the narrow bazaars, chickens flying in all directions as it tears along at several miles per day, may or may not be a sight for sore eyes, but is certainly a strain on the ear drums. Its resemblance to "The Cheltenham Flyer" is not complete.

Zanzibar with its northern neighbour Pemba forms a British Protectorate. Its population is mixed to a degree unknown in any western country, and no bazaars in the world are more colourful than those of Zanzibar Town. Representatives of a score or more of picturesquely garbed Indian races jostle Arabs and Negroes. Many tongues can be heard, but Swahili is the lingua-franca, that native language so widely spoken on the mainland of North East Africa.

The writer of this lived for a time in Zanzibar. One could not tire of wandering through the busy bazaars, watching the Indian and Arabian craftsmen seated cross-legged beating brass or silver, or making shoes and sweetmeats, as had been done similarly for centuries. And those early morning visits to the markets! Heaps of gleaming silver and golden fish just hauled from the sea, and piles of bananas, pineapples, coconuts, pawpaws, leeches, jack-fruit, and mangoes. Yes, that most wonderful of all fruits the mango. One could buy a basketful for a few coppers, and to the uninitiated they would provide a wash as well as a feast.

Who could forget those tropical nights! One sat out on the roof under that great African moon, and the cool scented breezes wafted from the Indian Ocean made one forget the sweltering bazaars of the just ended day.

Zanzibar has had its ups and downs, but on the whole it is generally prosperous. It provides the world with most of its cloves, and to walk through one of those groves, just after rain, when the small white clove flowers are out, is just a trip through Eden.

The Portuguese were once owners of the island, and though they were expelled as long ago as the 16th century there is still some visible evidence of their occupation. Zanzibar Town itself contains one of the forts which the Portuguese erected. From the time of their expulsion until the middle of the 19th century

the Imams of Muscat were the virtual rulers. Then Germany became interested, but she was bought off by the ceding of Heligoland, and in 1890 Great Britain took over and, of course, has remained there ever since.

Zanzibar issued its first stamps in 1895. Those for use in British India were overprinted, and so numerous were the errors and varieties that by the time Zanzibar's own specially produced stamps appeared in 1896, Gibbons had added over 100 stamps to their list. Catalogue editors were apparently made of sterner stuff in those days. One just shudders to think what would be said to-day if the whole of the British Empire produced as many varieties in a decade as did Zanzibar in a single year.

An issue bearing the portrait of the then Sultan was placed on sale 10 months after the overprinted stamps appeared. These stamps were quite attractive, and though printed in England, have by virtue of their design an appearance that somehow fits the country they were prepared for. This applies generally to all the stamps of Zanzibar, except the first overprinted issues.

The death of the Sultan Seyyid Hamedbin-Thwain saw the substitution of his portrait on Zanzibar's stamps for that of his successor, and these stamps remained on issue until replaced in 1904 by a set which had the monogram of the new Sultan instead of his portrait.

In 1908 another set appeared and the higher values of these are particularly interesting to the writer. The waterfront of Zanzibar Town is depicted on these stamps, and almost in the centre can be seen the tower attached to what was once upon a time the Sultan's Palace. The whole building is now used for Government offices and the present Sultan uses the building to the left as his residence. As can be imagined, it is exceedingly cool after sundown at the top of that tower, for it is quite

open and evening breezes from the Indian Ocean keep the mosquitoes on the move. Many times did the writer use it as a bedchamber.

The present Sultan Kalif bin Harub, a kindly figure, replaced Sultan Ali bin Hamoud, who was removed for intriguing with the Germans who, forgetting their bargain as they always do, were trying once more to get a foothold.

However, the new Sultan did his best to put a stop to that, and the rupee values of the stamps issued at the beginning of his reign have two interesting designs. One is that of a native fishing boat, with outrigger. To see these frail craft streaming in at an incredible (Cont. on page 285)



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For other Stamp Advertisements see pages 282 and v.

Stamp Gossip and Notes on New Issues

During the past few years several new stamp catalogues have appeared, and as they apparently suit the taste of modern collectors, the announcement of a new edition of one of the older established catalogues is perhaps not the event it might otherwise have been. For those who may be interested, however, it can be mentioned that Messrs. Whitfield King and Co., the provincial stamp dealers, advise that in the autumn they are bringing out another volume of their "Whole World" catalogue, at the price of 12/6. The pre-war price of this book was 5/-. Whilst it is not suitable for specialists, beginners and young collectors will no doubt find it useful.

It is now 12 years since New Zealand first issued its "Health stamps." The 1931 pair, catalogued by Gibbons at 18/-, brings over 30/- wholesale, and whilst not so scarce, all subsequent issues are well worth collecting when they can be found, though none has been outstandingly beautiful. In fact, when the 1942 issue appeared the writer of these notes suggested that a complete change in appearance of future emissions might not prove unprofitable to the fund these stamps benefit.

Well, apparently we are going to see that change with a vengeance. The stamps are to be triangular in format, and each bears a portrait of one of our two princesses. As usual there will be two stamps, 1d. plus ½d. and 2d. plus 1d., green and brown respectively, and the fact that they are now to be printed in this country by Bradbury, Wilkinson and Co. Ltd., assures a good piece of work. Record sales should result. The New Zealand Government think so too, for 6,000,000 are being printed, which is several times more than has ever been previously sold of any one issue.

We have two South American stamps to illustrate this month. The first comes from Argentina, and this represents an effort to commemorate the first book fair in Buenos Aires. The idea is no doubt a good one, but the stamp itself is of moderate design and worse execution, and we are afraid that the same applies to the new Brazilian stamp, issued to commemorate the foundation of the city of Petropolis. It will be noticed, incidentally, that the new currency has been used for this stamp, though stamps showing reis and milreis are still being used.

There is news from Brazil that stamps have been prepared to commemorate the centenary of the first postage stamps to be used on the American continent. One hopes that Brazil will prepare something better than recent commemoratives. The occasion warrants something special.

British collectors can only envy the luck of their cousins in the U.S.A. for having postal authorities with vision and enterprise. Besides the "Four Freedoms" stamp, one of which we are illustrating, there is



news that the United States is to issue 11 stamps in honour of the countries which have been overrun by the Axis. There is to be one for each of the following: Poland, Czechoslovakia, Norway, Belgium,

Luxembourg, Holland, France, Greece, Yugoslavia, Albania and Austria. Each stamp is to bear in natural colours the flag of the country honoured, so collectors are assured of an interesting set.

We are also illustrating the new 1 anna stamp of India. It is coloured pink, and this about completes the set of smaller sized stamps which have been issued in this reduced size to save paper. There is no news yet whether the rupee values will be similarly treated or not, but just to be on the safe side collectors might do worse than get busy filling their gaps in this set, for whilst the stamps up to 10 r. are common enough, the 15 r. and 25 r. are as scarce as the proverbial hen's teeth, and if these two latter values were replaced many collectors would have to go without.

A reader recently sent us two Gilbert and Ellice stamps with their watermarks sideways, and requested an opinion on these. As it happened, sideways was the normal position of the watermarks of these stamps, otherwise they would have been interesting enough to have been noted in the catalogue.

It sometimes happens that there is a change in the position of watermarks in a new printing of some particular stamp, as occurred recently in the case of the 1d. and 2d. Gibraltar, and the 24 c. British Guiana, and these varieties are generally given catalogue ranking if they are sideways, or go from sideways to upright. It is only rare that much notice is taken if the watermark is simply upside down, though in some cases even this would be considered interesting.

A number of collectors are wondering how they can distinguish between the 5d. stamps of Great Britain which were overprinted in Cairo and London. Well, it isn't hard really, in spite of what has been said to the contrary, for apart from the actual size of the overprints, which differ slightly in this respect, two quite distinct inks were used. The letters "M.E.F." of the Cairo overprint are a dull black, whereas those overprinted in London are shiny blue-

black.

Stamp Collecting—(Continued from page 283)

rate is quite a sight. The other depicts the ubiquitous dhow.

The last set to date was the Jubilee issue of 1936. They are handsome stamps, and the carved teak door shown in the centre of the design is typical of those used in many houses in romantic Zanzibar, "Queen Island" of the Indian Ocean.

Stamp Editor's Note.—Our stamp articles are intended to help beginners to start collecting in the right way, and to get more and more pleasure from their hobby as time goes on. The Stamp Editor is always delighted to answer any queries, to give information, and to make suggestions, but he cannot undertake to value stamps.



A Life-saving Rocket—(Continued from page 255)

Life-saving Apparatus Company set off with the then new Pistol Rocket Apparatus at 8.45 p.m. They drove to Feolin, and then had to abandon the car because there were no roads at all. In pitch-black darkness, over five miles of moorland and rocks, studded with great pot-holes, they made their way, in the teeth of a gale so intense that they had often to kneel down to avoid being thrown over bodily by the wind. Near the trawler, they waded out waist-high on to a reef and set up the apparatus. They were



Enthusiastic Hornby Speed Boat owners waiting for the starting signal of a race. Photograph by J. L. Barrons.

firing from the extreme maximum range then obtainable, 130 yards; and at 12.30 a.m. their very first shot landed plump on the decks of the "Crak." By 1.15 a.m. the entire crew of 11 had been safely taken on shore.

For this exploit the company was awarded the Board of Trade Shield given annually for the finest rescue of the year.

Only the Schermuly apparatus could have been carried over this desperate journey, and only with steel rockets fired on the torpedo principle could the first shot conceivably have been put across the ship.

That is why a British seaman will always be remembered for inventing a pistol that saves lives.

D.H. "Mosquito" Bomber—(Cont. from page 261)

not a transparent nose, and is fitted with a flat bullet-proof windscreen instead of the Vee-shaped double-glass one in the bomber. The four 20 mm. cannon are in the front part of the bomb bay, and the four 0.303 in. machine guns are mounted in the nose, through which they project with sinister effect. There is an armour-plate bulkhead behind the machine guns. All the guns are fired electro-pneumatically by operating switches on the control column in the cockpit, and power is supplied by an air compressor in the port engine nacelle. This compressor also works the wheel brakes of the retractable undercarriage.

45 Years of Railway Photography—(Cont. from p. 271)

we generally made a halt at a very suitable spot we had discovered near Kilsby tunnel on the L.M.S. main line, arriving there in time to "shoot" the up "Royal Scot" and "Irish Mail." We usually remained there for about an hour, after which we would push on to Stafford, staying there for the night. Next day would be spent at Whitmore troughs, where one could walk along a footpath beside the line, apparently unmolested. We usually had the best part of the day here, leaving about 5 p.m., which would give us ample time to get a long way on our journey before dark. Our object of course was to avoid wasting valuable daylight in travelling, and

whilst a certain amount of time must inevitably be spent on the road, it will be apparent that a car for such a tour is a real boon, because a halt at any time can be called at the many suitable spots which one passes in the course of a long journey, which have very often been undiscovered previously.

I hope I have said enough to interest readers in a hobby which still remains for me of absorbing interest; and I can only conclude by saying that, however long this enforced abstinence continues, it remains my firm intention to resume at the earliest possible moment. Who knows? I may be only capable of hobbling about with the aid of two sticks and be the possessor of a long white beard, but as Charles is of the same mind, I can but feel sure that before many years have passed we shall again be leaving our spare trousers behind and falling into streams after the good old-fashioned custom.

Have You Ever Thought

About This?—(Con. f. p. 259)

in the engine as the new petrol. Suppose that in this case a mixture of 20 per cent. normal heptane and 80 per cent. iso-octane is required, then the octane number of the petrol is 80. This is a reasonably high octane number, although 100 octane fuels are now being

supplied to the R.A.F.

Soon, of course, the results of the progress made in the design of aero engines will be applied to all petrol engines. This is one instance in which the aircraft industry is helping forward post-war car design.

H. ASHLEY KIRBY, B.Sc.

POOLE'S CAVERN

A short time ago I paid a visit to Buxton, in Derbyshire, and while there went to Poole's Cavern. This cavern, which is in limestone hills, is so-called because at one time it was the hiding place of the robber Poole. The cavern is comparatively short, being only about $\frac{1}{4}$ mile in length. The main attraction is the many stalactite and stalagmite formations, some of which are transparent, while others take on the most peculiar shapes. One stalagmite, for instance, looks like a gigantic oyster. There is also a group of stalagmites which go under the name of "poached eggs," and they really do look like poached eggs; this is due to the presence of iron oxide. About half-way along the cavern is an extremely large stalactite, which unfortunately is broken, though even now it is well over 5 ft. long.

These stalactites and stalagmites are formed by rain water soaking through the ground and dissolving various chemicals until it reaches the roof of the cavern, where evaporation takes place, leaving only the solid, which is the stalactite. Stalagmites are formed by some of the water dripping down to the floor of the cavern and evaporation taking place there. It is reckoned that these stalactites and stalagmites take about 100 years to "grow" one inch.

The cavern was originally made by an underground stream, which comes to the surface a little to the south of Buxton. It is the Derbyshire Wye. In Summer it almost dries up, but in Winter it rushes along at a terrific pace. In the cavern, across the stream is a natural bridge.

A great variety of interesting relics have been found in this cavern, and a collection of them is housed in a museum near by. They include not only pottery of various kinds, but also animal and even human remains.

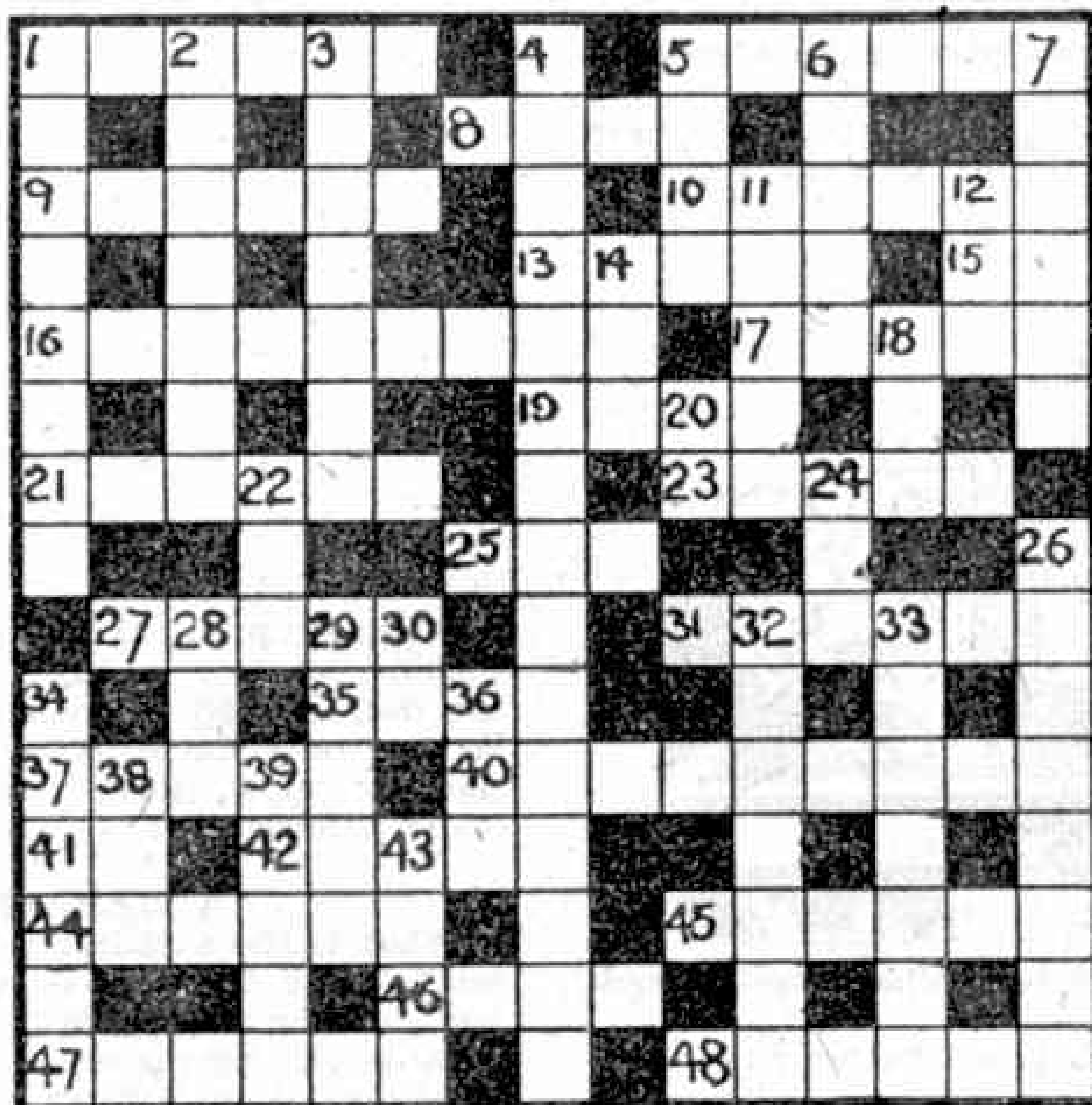
P. F. MARLOW (Uttoxeter).

Competitions! Open To All Readers

A Holiday Month Crossword Puzzle

CLUES ACROSS

1. Deformed Idiot (6)
5. Flowering Tree (6)
- 8 Low ground between hills (4)
- 9 Tillable (6)
- 10 Distribute (6)
- 13 Type of intonation (5)
- 15 Abbreviation (initials) (2)
- 16 Of incorrect reasoning (9)
- 17 Wants (5)
- 19 Ripe (4)
- 21 Without difficulty (6)
- 23 Willow (5)
- 25 Trim (3)
- 27 Rift (5)
- 31 From the far North (6)
- 35 Roman garment (4)
- 37 Banned (5)
- 40 Profession (9)
- 41 Since (2)
- 42 Toadstools (5)
- 44 Jewish anaider (6)
- 45 Set fire to (6)
- 46 Fish (4)
- 47 Keeps short (6)
- 48 Madhouse (6)



CLUES DOWN

- 1 Wind Instrument (8)
- 2 Makes possible (7)
- 3 Forbidden (7)
- 4 Very famous Italian Painter (8, 2, 5)
- 5 Woe! (4)
- 6 Division of part of church (5)
- 7 Witness (6)
- 11 Sea shore (5)
- 12 Relieve (3)
- 14 Drink (3)
- 18 Spin out (3)
- 20 Dissent (2)
- 22 Creeper (3)
- 24 Annoy (3)
- 26 Night Light (8)
- 28 Part of some aprons (3)
- 29 Beverage (5)
- 30 Thus (2)
- 32 Trinket (7)
- 33 First (7)
- 34 Degrees (6)
- 36 Muzzle (3)
- 38 Tree (3)
- 39 Frequently (5)
- 43 Assents (4)

Again we give our readers one of our straightforward crossword puzzles. It is contributed by a reader, A. W. N. Ede, and every word in it can be found in standard dictionaries. The competition is divided into sections for Home and Overseas readers, in each of which prizes of 21/-, 10/6 and 5/- will be given for the best solutions. If necessary the

judges will take neatness and novelty into consideration when making their awards. Consolation prizes will be given for other meritorious efforts.

Entries should be addressed "August Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13." Closing dates: Home Section, 30th September; Overseas Section, 27th February, 1944.

August Photo Contest

This month's contest is the 8th of our 1943 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions: 1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired, but entries in which the second condition stated above is not observed will be disqualified.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed "August Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Overseas readers. In each section prizes of 15/- and 7/6 will be awarded. Closing dates: Home Section, 31st August; Overseas Section, 27th February, 1944.

COMPETITION RESULTS

HOME

March Knight's Tour Contest.—1. A. B. Partridge, Northampton. 2. J. Mann, Otley. 3. T. C. Smith, Bromsgrove. Consolation Prizes: A. J. B. Lilley, Thornton Heath; K. J. Alford, West Croydon; R. G. Chorley, Ambleside.

March Photographic Contest.—1st Prizes, Section A: C. A. Reader, Guildford; Section B: D. M. Cox, Cardiff. 2nd Prizes, Section A: H. Briercliffe, Glasgow W.4; Section B: A. E. Davies, Daventry. Consolation Prizes: R. Atkins, Eccles; S. S. Pethybridge, Newton Abbot; J. Selby, Tring; N. Bentley, Leeds 6.

March Track Diagram Contest.—1. W. J. Simon, Chesterfield. 2. P. B. Coaker, Walton-on-Thames. 3. R. G. Lucas, New Barnet. Consolation Prizes: R. M. Haines, Hove 4; G. Stamford, Camberley; K. Elliott, Loughton.

April Stamp Picture Contest.—1. N. Whitfield, Glasgow. 2. K. Alford, W. Croydon. 3. E. Bradshaw, Greenock. Consolation Prizes: J. E. Smith, Chelmsford; J. Arden, Terrington; E. G. Smith, Chorlton-cum-Hardy.

April Photographic Contest.—1st Prizes, Section A: H. Briercliffe, Glasgow; Section B: D. M. Cox, Heath. 2nd Prizes, Section A: C. A. Reader, Guildford; Section B: G. Barton, Southport. Consolation Prizes: Mrs. L. M. Booth, Richmond; P. Milne, Whyteleafe; M. Taylor, Southall; R. Atkins, Eccles.

April "Jumbled Locomotive Names" Contest.—1. F. Mills, Kearsley. 2. R. Parker, Coventry. 3. M. Neale, Nottingham. Consolation Prizes: N. J. Claydon, Sutton Coldfield; P. Blayney, Nottingham.

May Photographic Contest.—1st Prizes, Section A: J. H. Gittens, Weybridge; Section B: J. Selby, Tring. 2nd Prizes, Section A: B. Priestley, Silcoates School, Nr. Wakefield; Section B: G. Peile, London S.E.1. Consolation Prizes: D. Rebbeck, Belfast; Y. Thomas, Haslemere; B. Chulmdra, Rock, Nr. Weybridge; A. Priestley, Silcoates School, Nr. Wakefield.

OVERSEAS

October Signalling Contest.—1. F. Harrison, Capetown. 2. C. Turner, Johannesburg. 3. D. Patterson, Capetown. Consolation Prizes: S. Woods, Ottawa; B. J. Finch, Johannesburg.

November Wagons Contest.—1. B. T. Atkinson, Johannesburg. 2. K. van Vleit, Capetown. 3. J. K. Matthews, Sydney.

Fireside Fun

The volunteer driver during a strike brought in a train nearly half an hour before time, and the passengers crowded round the engine.

"We have taken up a subscription as an expression of thanks," said one of them.

"Don't thank me," replied the volunteer. "You're lucky. I've only just found out how to stop the thing."



"Wants his bill paid, does he. What does he look like?"

"Well, he looks as though you'd better pay it!"

"Here, Freddy, there's a nice book about a good kind missionary who was killed by the wicked savages."

"Thanks, mamma. Do you have to read far before they kill him?"

"Why are ye looking so sad, Mike?"

"Sure, Tim, the doctor gave me some pills."

"Well, what then?"

"He said I was to take one three times a day, and how can I do that?"

"Aye, I'm the oldest man in the village, an' I haven't an enemy in it."

"That's fine, Ben. I'm glad to hear it."

"Yes, sir, they're all dead now."

BRAIN TEASERS

SLOGANS IN DISGUISE

The three arrays of letters given below hide three slogans that have been very much in evidence during the war years. The letters are given in alphabetical order, and all of them have to be used in each case. Can you find what slogans they represent?

C F G I I N O O R R S T V W Y
A A A E E G G H I I L N P P S S S S V V
B B B E F H I L M O O R R S T U Y



"You'll have to buck up on your homework, Dad! You only got 10 out of 20 for last night."

TOO MANY ROUTES.



In this square of 36 dots, each dot represents a turning point or junction. A traveller beginning from the dot marked A wishes to reach that marked B. He can only move from any one dot to that on the right or below, never upward or to the left. In how many different ways can he make the journey?

A WEIGHTY PROBLEM

What is the smallest number of weights, and what weights are these, that would be required to weigh any number of pounds from 1 to 121 inclusive? The weights can be placed in either or both of the pans of the scale or balance used.



Sergeant: "What's the first thing to do before cleaning your rifle?"

Recruit: "Have a look at the number."

Sergeant: "Have a look at the number? What for?"

Recruit: "To make sure you're not cleaning another bloke's rifle."

SOLUTIONS TO LAST MONTH'S PUZZLES

The hidden proverb of our first puzzle last month begins with the 5th letter, B, in the 6th row. With this as a start it will be easy to trace out "*Birds of a feather flock together.*"

The names of the nine leaders of the war in our second puzzle are printed here in capitals. "In a PORT ALI ships are berthed or anchored. The BROOK Enters the low lands and meANDERS ON through the fields before losing itself in the MARSH ALL along the dunes. We met ALEX AND ERnest POUNDing along on their bicycles, and from their pace BEN Estimated that they would reach their destination in an hour or so. You are not allowed paST A LINE on the edge of the PARKing place."

The calculation in our third puzzle was very easy indeed. The first boy cycling at 15 miles an hour covered two miles in 8 min., and walked the remaining two miles in 40 min., giving a total of 48 min. The second boy required exactly the same time, but got his foot-slogging over to begin with.

THIS MONTH'S HOWLER

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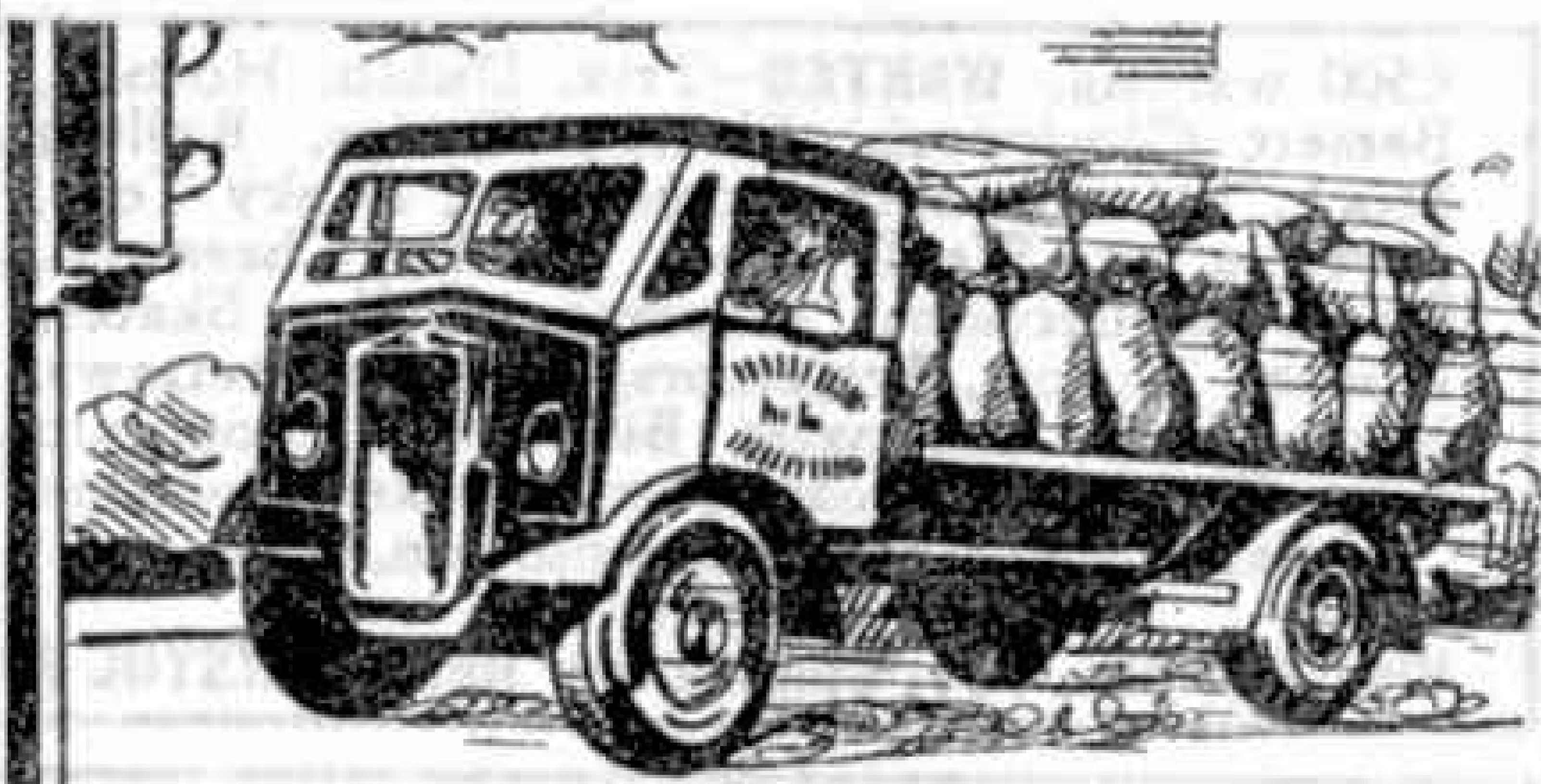
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(See also pages 282 and 284)

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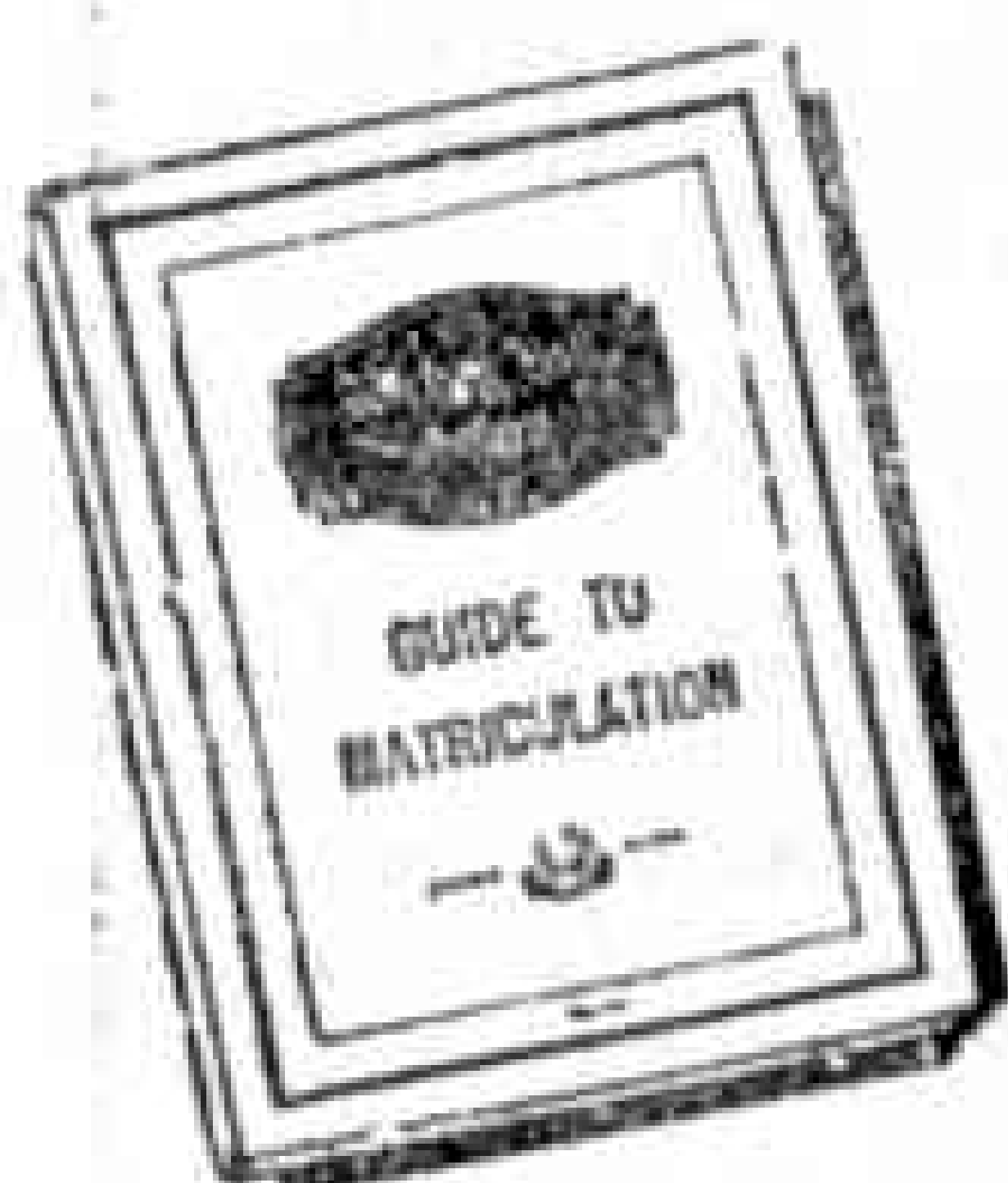
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These binding cases are supplied so that readers can have their Magazines bound locally, but where desired the firm mentioned above will bind the 12 issues of the 1942 "Meccano Magazine" at a charge of 10/-, including the cost of the binding and also return carriage. The covers of the Magazine may be included or omitted as required.

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Ground Engineer	Woollen Manufacturing
Heating and Ventilating	Works Engineering
Hydraulic Engineering	Works Management

And most of the Technical, Professional and Matriculation Exams.

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MECCANO MAGAZINE

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Cash with order. Editorial and Advertising matters
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Readers' advertisements are published as soon as
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Display. Quotations for space bookings, and latest
net sale figures, will be sent on request.

READERS' SALES AND WANTS

SALES

"Meccano Magazines," Jan. 1936-April 1940; Ubi
Saloon; Askalite Set; Mappa-Mundi and other Jig-
Saws. Offers?—P. Noades, 6, Wicker Hall, Royston,
Herts.

Several well finished Adjustable Morse-Tappers;
cheap; S.A.E. details.—Smith, 294, Wellington Road,
Heaton Chapel, Stockport.

Assortment of Meccano Parts as New including
Motor and Transformer; lot £5.—Goodwin, 339,
Grove Green, Leytonstone, E.11.

Annuals: "Tiger Tims" 1938-1941; "Crackers"
1939-1940; "Knockout" 1941; "Sparkler" 1939;
"Chis" 1940; "Golden" 1940; "Butterfly" 1940.
Excellent condition, what offers?—Bullock, 14, Grey-
stone Gardens, Kenton, Middlesex.

143 Comics: "Rovers," "Champions," etc. What
offers? P. Page, Church Road, Gurnard, I.O.W.

35 mm. Silent Films for Sale; "Westerns," etc.;
16 mm. Film "Navy in Wartime," 200 ft., new £3;
Three-Spring Cricket Bat, 25/-. Stamp details.—
Green, 321, Kingsway, Dundee.

"War Illustrated," 1-112, complete, new, £1 lot;
"Shipping Wonders," 55 parts complete, £1; "World
War," 1914-1918, pub. 1936, 55 parts complete, £1;
"Boxing," 1933-1938, complete six years, bound,
£6 lot; large new Toy Fort, 35/-; smaller one, used,
12/-; Rocking Horse on Base, £2/15/- carr. free;
Baby's Bumper Chair on Castors, new, pink, 16/-;
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any of the above for Toys suitable for boys aged
7 and 11, not Forts or Soldiers, or for Weekly Comics
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200-250 A.C. Mains.—Brown, 30, Chirton Green,
North Shields, Northumberland.

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way, Southall.

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No. 1 Clockwork Loco. with or without Tender; good
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Somerden Road, St. Mary Cray, Kent.

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Mogul, gauge "0," L.N.E.R. or L.M.S., steam or
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Orchard Cottage," Saunderton, Princes Risborough,
Bucks.

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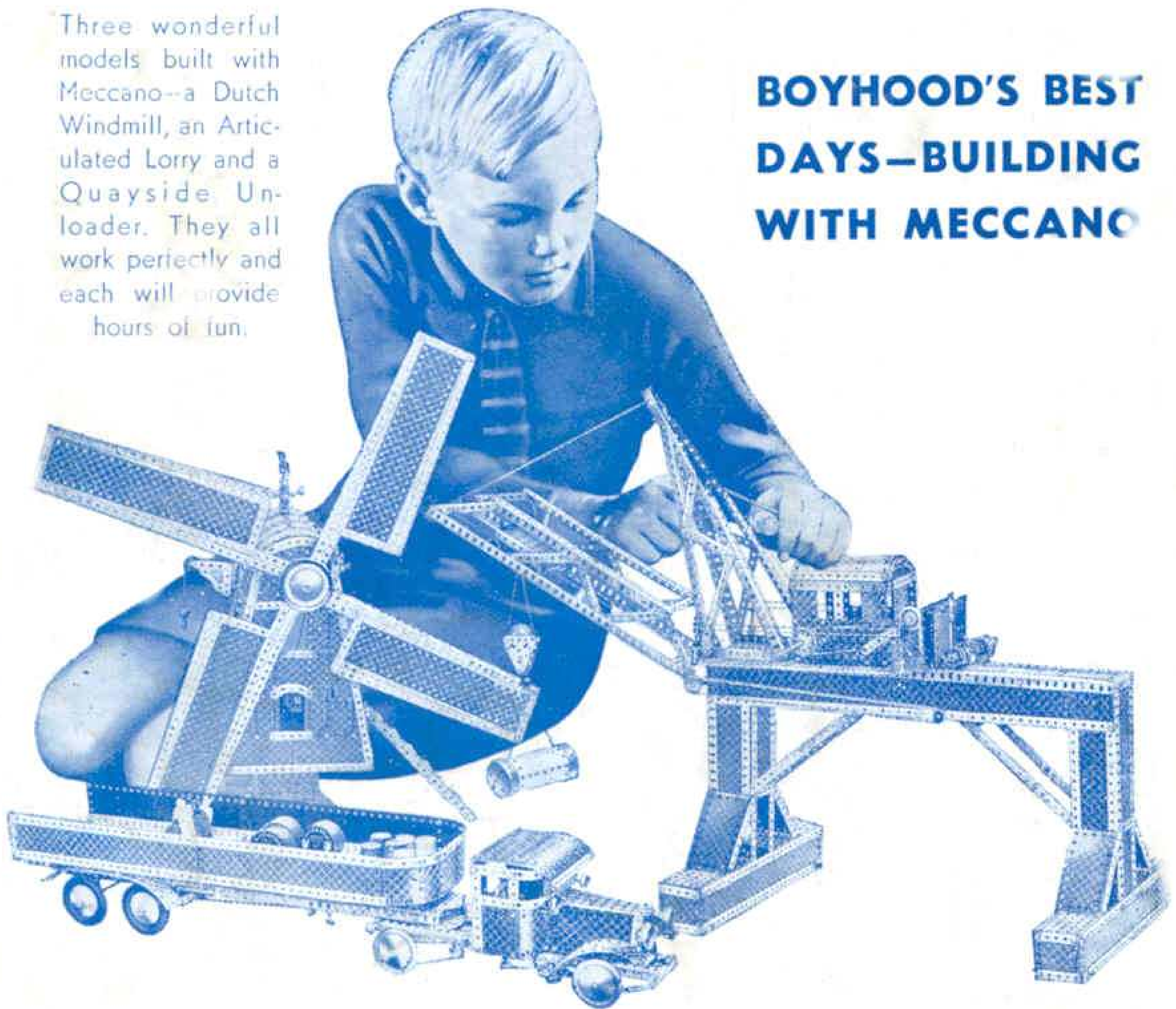
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